HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

Hermon Laboratories Ltd.
Harakevet Industrial Zone, Binyamina 30500,
Israel
Tel. +972-4-6288001
Fax. +972-4-6288277
E-mail: mail@hermonlabs.com

TEST REPORT

EIRP AND SPURIOUS EMISSIONS

ACCORDING TO: EN 300 440-2 V1.4.1: 2010, EN 300 440-1 V1.6.1: 2010; EN 301 511 V12.1.1: 2015, EN 301 908-2 V6.2.1:2013

EMF ASSESSMENT

ACCORDING TO: EN 62311:2008

FOR:

Pointer Telocation Inc.

Vehicle Tracking equipment with GPS/GNSS receiver and one of GSM/UMTS modules

1) **CR300B 2G,**
   Part numbers: CT7801201-000, CT7801211-000
2) **CR300 2G, Part number: CT7801205-000**
3) **CR300B 3G EU,**
   Part numbers: CT7801202-000, CT7801212-000
4) **CR300 3G EU, Part number: CT7801206-000**

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1 Applicant information

Client name:	Pointer Telocation Inc.
Address:	7715 NW 48th Street, Suite 395, Doral FL 33166
Telephone:	001 (305) 903-6634
Contact name:	Mr. Jay Pico

2 Equipment under test attributes

Product name:	Tracking vehicle product
Product type:	Transceiver including a GPS receiver and one of GSM modules 1) CR300B 3G EU, P/N CT7801202-000 or 2) CR300B 2G, P/N CT7801201-000
Hardware version:	B
Software release:	43
Receipt date	01-Oct-15

Note: according to manufacturer's declaration of identity provided in Appendix G of the test report, the EUT part numbers CT7801201-000 & CT7801211-000, as well as CT7801202-000 & CT7801212-000 are electronically / electrically / mechanically identical and the reason of the change is marketing purposes; the EUT part number CT7801206-000 is the same as CT7801212-000 but without internal battery; the EUT part number CT7801205-000 is the same as CT7801211-000 but without internal battery. That is why the EUT part numbers CT7801201-000 and CT7801202-000 only were tested.

3 Manufacturer information

Manufacturer name:	Pointer Telocation Ltd.
E-Mail:	itamarg@pointer.com
Contact name:	Mr. Itamar Gohary

4 Test details

Project ID:	27317
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	30-Sep-15
Test completed:	26-Oct-15
Test specification(s):	EN 300 440-2 V1.4.1: 2010, EN 300 440-1 V1.6.1: 2010; EN 301 511 V12.1.1: 2015, EN 301 908-2 V6.2.1:2013 EN 62311: 2008

5 Tests summary

Test	Status
EN 300 440-1 V1.6.1	
Receiver parameters	
Spurious radiation	
Receiver spurious emission (radiated)	Pass
EN 301 511 V12.1.1	
Transmitter parameters	
Equivalent isotropically radiated power	Pass
Spurious emission (radiated)	Pass
EN 301 908-2 V6.2.1	
Transmitter parameters	
Equivalent isotropically radiated power	Pass
Spurious emission (radiated)	Pass
EN 62311: 2008, Section 4- Conformity Assessment Methods	
Far field calculation – Annex A	Pass
Near field calculation – Annex A	Not required
Simulation with/without a phantom – Annex B	Not required
Numerical modelling – Annex C	Not required
Body/limb current – Annex D	Not required
SAR – Annexes E, C	Not required
E and H measurement – Annex F	Not required
Source modelling – Annex G	Not required
Direct measurement of physical properties: Contact current – Annexes D, E, F	Not required

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mrs. E. Pitt, test engineer	October 26, 2015	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	March 14, 2016	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	March 15, 2016	

6 EUT description

6.1 General information

The EUT is a tracking vehicle product which includes the GSM module CR300B 3G EU operating in 1920-1980 MHz band or CR300B 2G operating in 1710-1785 MHz band and GPS receiver operating in 1575-1610 MHz band.

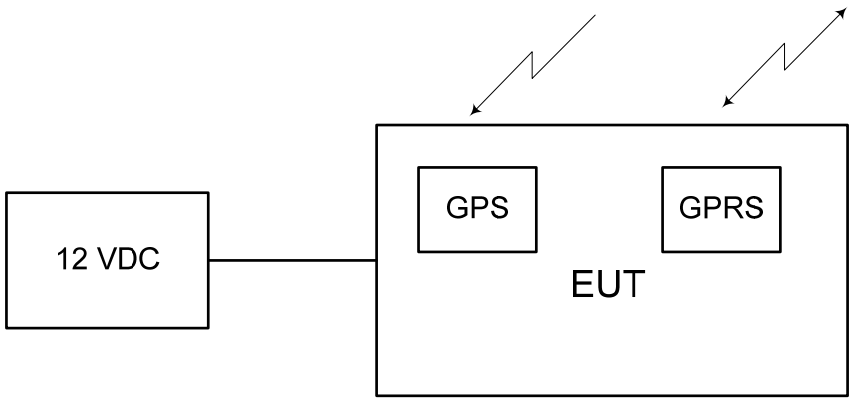
6.2 Ports and lines

Port type	Port description	Connected from	Connected to	Qty.	Cable type	Cable length
Power	DC	DC power supply	EUT	1	Unshielded	Less than 3 meter

6.3 Support and test equipment

Description	Manufacturer	Model number	Serial number
PC	Lenovo	2518-4PG	25184PG

6.4 Test configuration

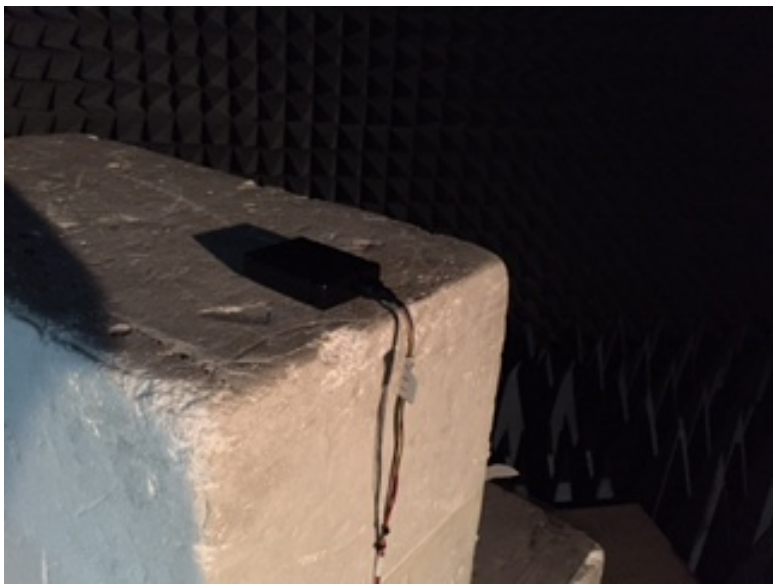


6.5 EUT test positions

Photograph 6.5.1 EUT in X-axis orthogonal position

Photograph 6.5.2 EUT in Y-axis orthogonal position

Photograph 6.5.3 EUT in Z-axis orthogonal position



Test specification:	EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

7 Receiver test according to EN 300 440-2 standard

7.1 Effective radiated power of receiver spurious emission

7.1.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Radiated spurious emission test limits

Frequency, MHz	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)*
25 - 1000	- 57.0 (2 nW)	40.35
1000 – 10th harmonic	- 47.0 (20 nW)	50.35

*- Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×1.64×P)/r, where P is ERP in Watts and r is antenna to EUT distance in meters.

7.1.2 Test procedure for spurious emission field strength measurements

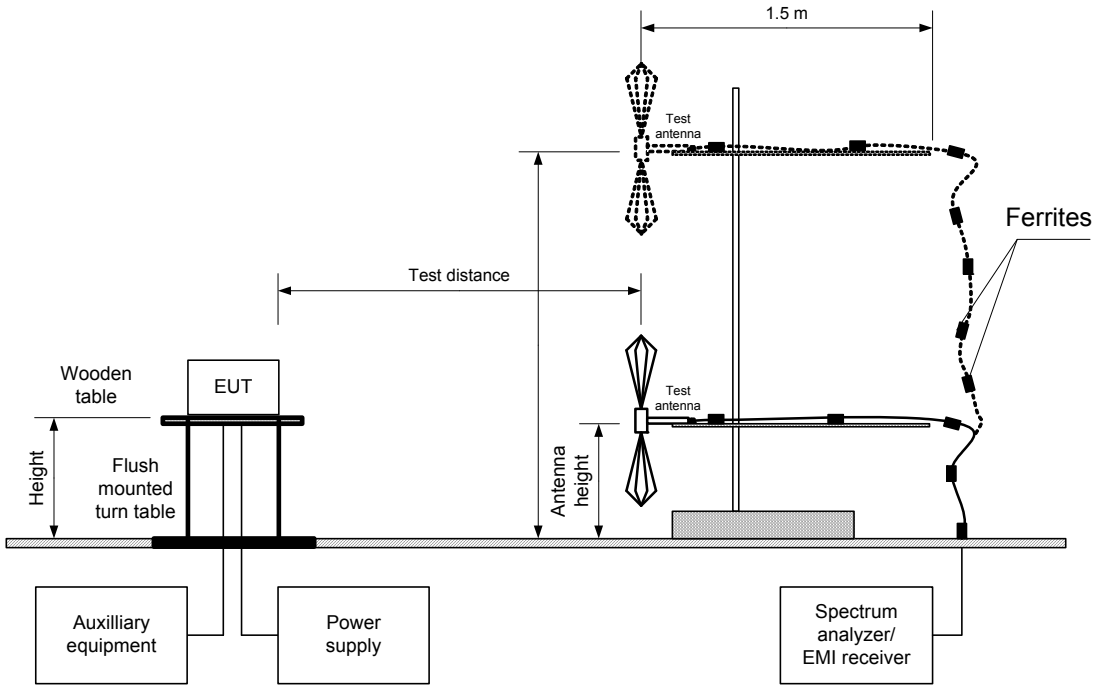
7.1.2.1 The EUT was set up as shown in Figure 7.1.1, energized and the performance check was conducted.

7.1.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the specified in Table 7.1.2 range in both, vertical and horizontal, polarizations.

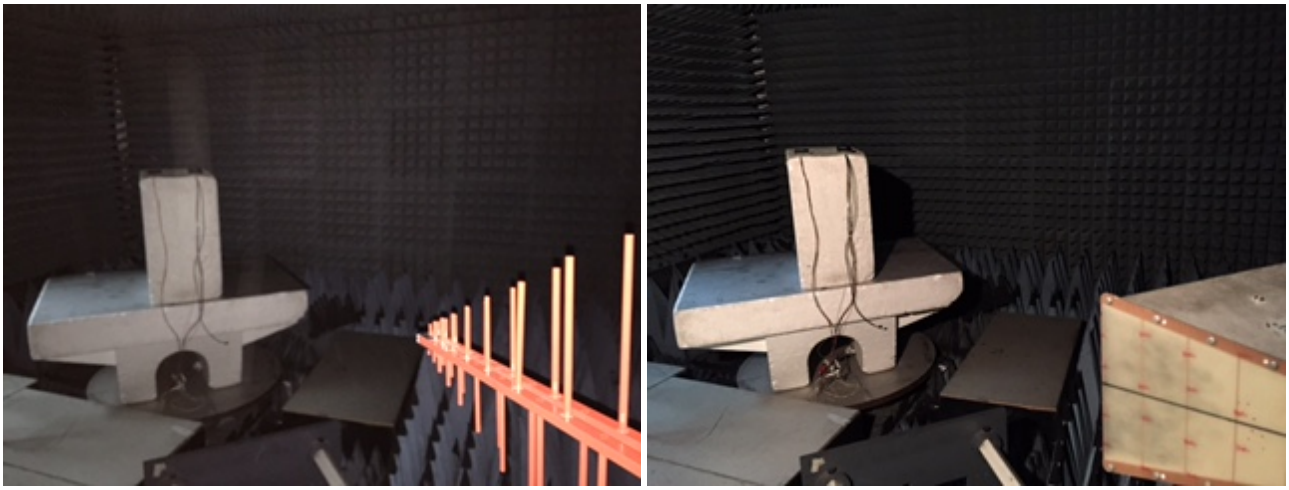
7.1.2.3 The worst test results (the lowest margins) were recorded in Table 7.1.2 and shown in the associated plots.

Test specification:	EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

Figure 7.1.1 Setup for spurious emission field strength measurements



Photograph 7.1.1 Setup for spurious emission field strength measurements



Test specification:	**EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)**		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks:			

Table 7.1.2 Spurious emission field strength test results in receive mode

ASSIGNED FREQUENCY RANGE:	1575-1610 MHz
EUT ANTENNA:	Integral
INVESTIGATED FREQUENCY RANGE:	25 – 17000 MHz
TEST DISTANCE:	3 m
EUT HEIGHT:	1.5 m
TEST ANTENNA HEIGHTS RANGE:	1.0 – 1.8 m
DETECTOR USED:	Peak / Quasi-peak (25 – 1000 MHz) Peak (above 1000 MHz)
RESOLUTION BANDWIDTH:	25 MHz – 1000 MHz: 120 kHz (6 dB RBW) above 1000 MHz: 1.0 MHz (3 dB RBW)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Biconilog (25 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
No spurious emission was found							

Verdict: Pass

*- Margin = Field strength of spurious – calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

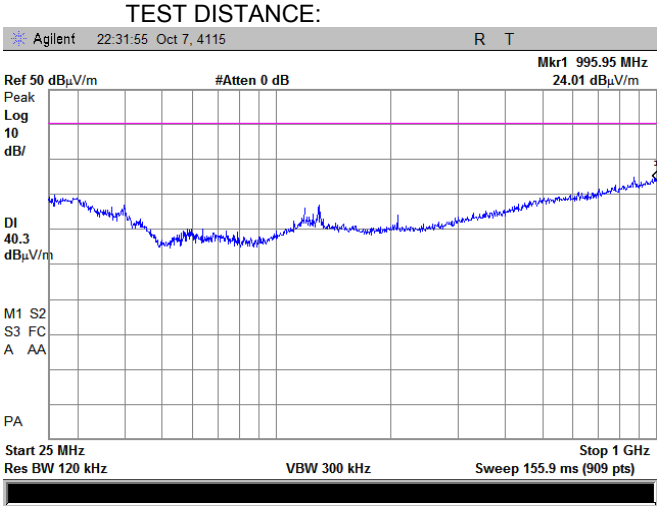
HL 2432	HL 2697	HL 2780	HL 4347	HL 4721	HL 4932		

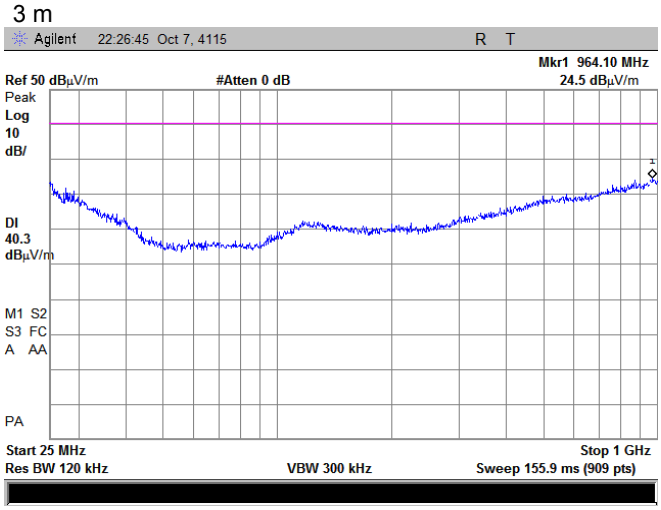
Full description is given in Appendix A.

Test specification:	EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

Iot 7.1.1 Radiated emission measurements in 25 - 1000 MHz range

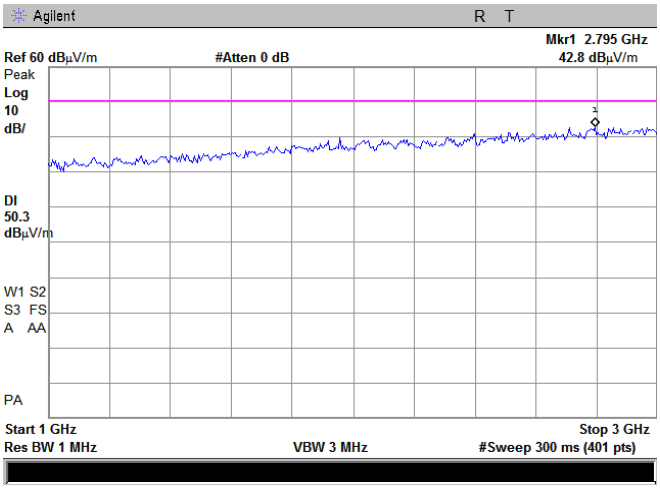
TEST SITE: Fully anechoic chamber
OPERATIONAL MODE: Receive
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

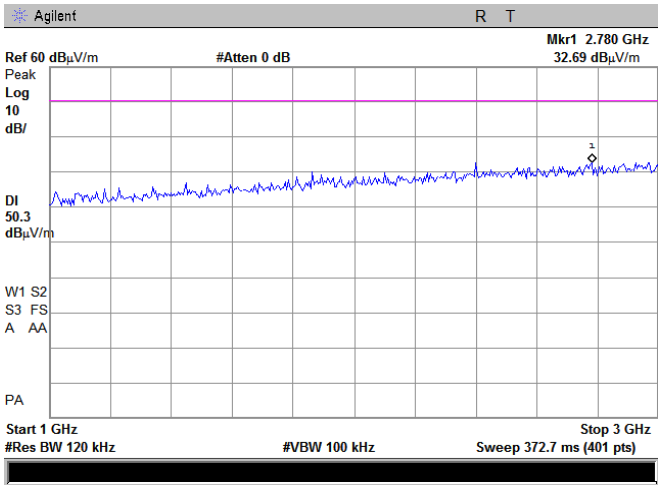




Plot 7.1.2 Radiated emission measurements in 1 – 3 GHz range

TEST SITE: Fully anechoic chamber
OPERATIONAL MODE: Receive
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

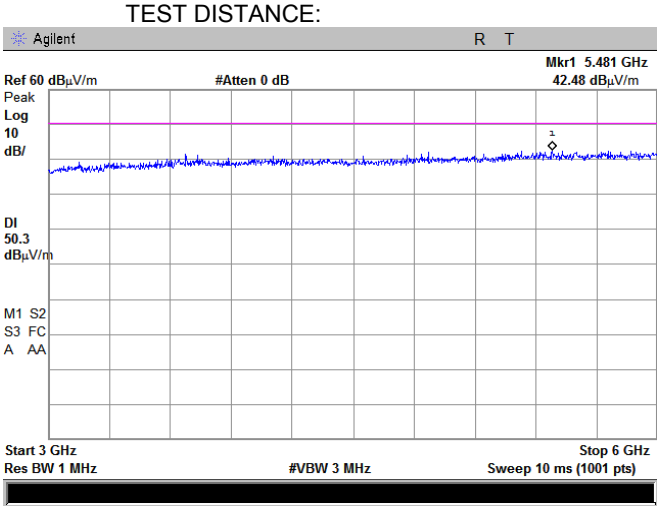


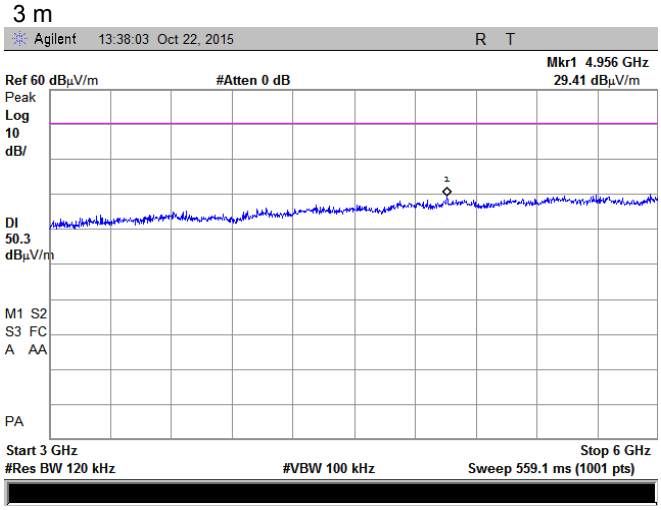


Test specification:	EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

Plot 7.1.3 Radiated emission measurements in 3.0 – 6.0 GHz range

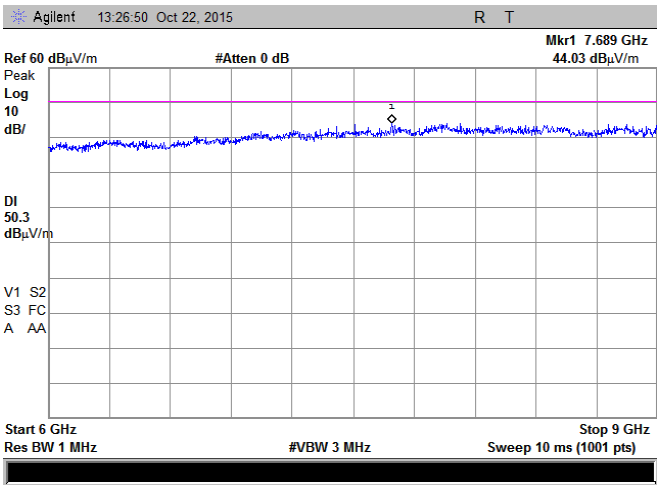
TEST SITE: Fully anechoic chamber
OPERATIONAL MODE: Receive
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

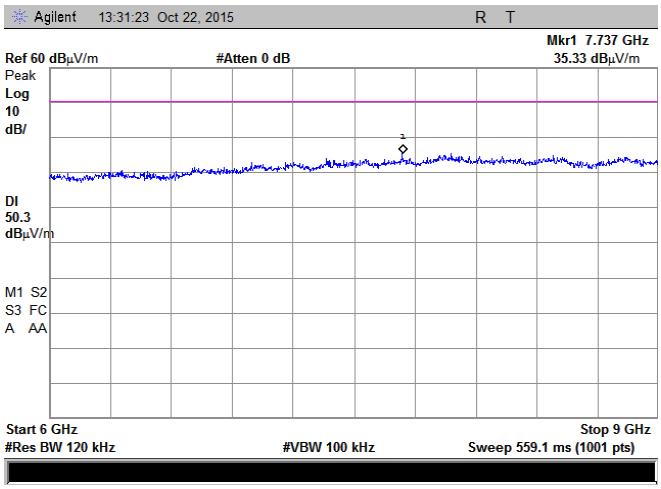




Plot 7.1.4 Radiated emission measurements in 6.0 – 9.0 GHz range

TEST SITE: Fully anechoic chamber
OPERATIONAL MODE: Receive
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

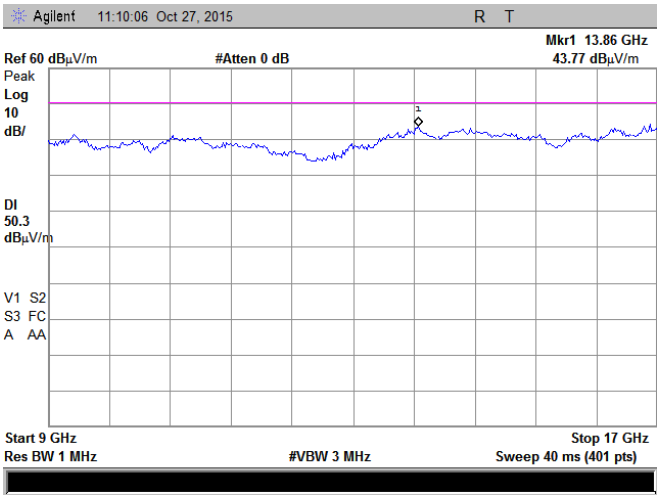


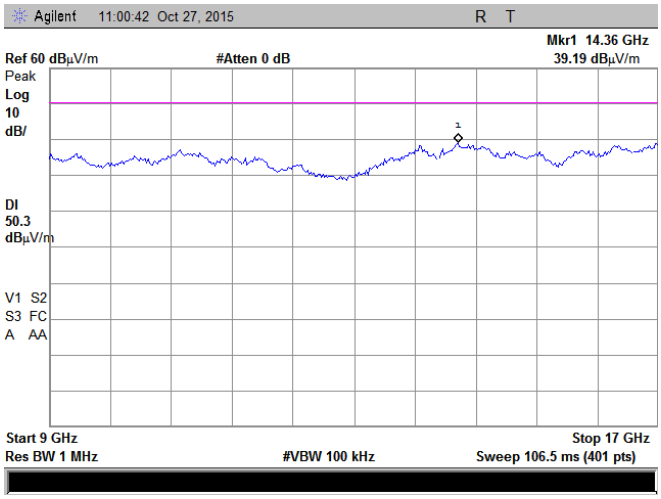


Test specification:	EN 300 440-2 section 5.4.3, Receiver spurious emission (radiated)		
Test procedure:	EN 300 440-1 V1.6.1 Section 8.3.3/8.3.4		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks:			

Plot 7.1.5 Radiated emission measurements in 9.0 – 17.0 GHz range

TEST SITE: Fully anechoic chamber
OPERATIONAL MODE: Receive
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m





Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

8 Transmitter parameters according to EN 301 511 standard

8.1 Output power of carrier

8.1.1 General

This test was performed to measure equivalent isotropically radiated power emanated by transmitter at carrier frequency. Specification test limits are given in Table 8.1.1.

Table 8.1.1 Output power limit

Assigned frequency band, MHz	EIRP		Equivalent field strength limit @ 3m, dB(μV/m)*
	W	dBm	
1710- 1785 MHz	1	30	125.23

*- Equivalent field strength limit was calculated from maximum allowed EIRP of carrier as follows: E=sqrt(30×P)/r, where P is EIRP in Watts and r is antenna to EUT distance in meters.

8.1.2 Test procedure for field strength measurements

8.1.2.1 The EUT was set up as shown in Figure 8.1.1, energized and the performance check was conducted.

8.1.2.2 The field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the range, specified in Table 8.1.2, in both vertical and horizontal polarizations.

8.1.2.3 The worst test results with respect to the limits were recorded in Table 8.1.2 and shown in the associated plots.

8.1.3 Test procedure for substitution EIRP measurements

8.1.3.1 The test equipment was set up as shown in Figure 8.1.2 and energized.

8.1.3.2 RF signal generator was set to the EUT carrier frequency and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

8.1.3.3 The test antenna height was swept throughout the specified in Table 8.1.2 range to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

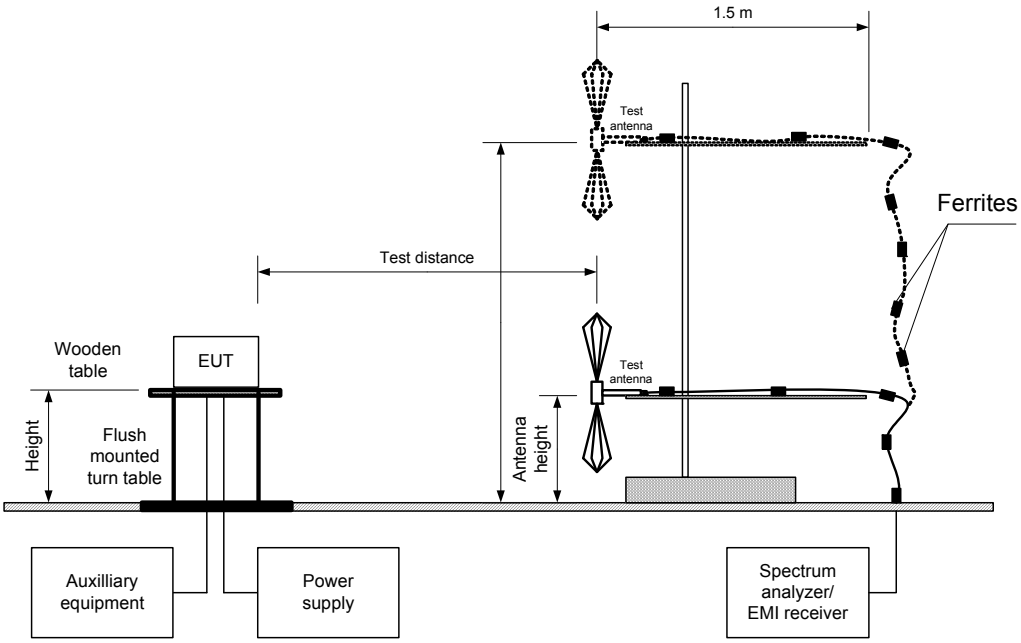
8.1.3.4 The EIRP was calculated as a sum of signal generator output power in dBm and antenna gain in dBi reduced by cable loss in dB.

8.1.3.5 The above procedure was performed in both horizontal and vertical polarizations of the test antenna.

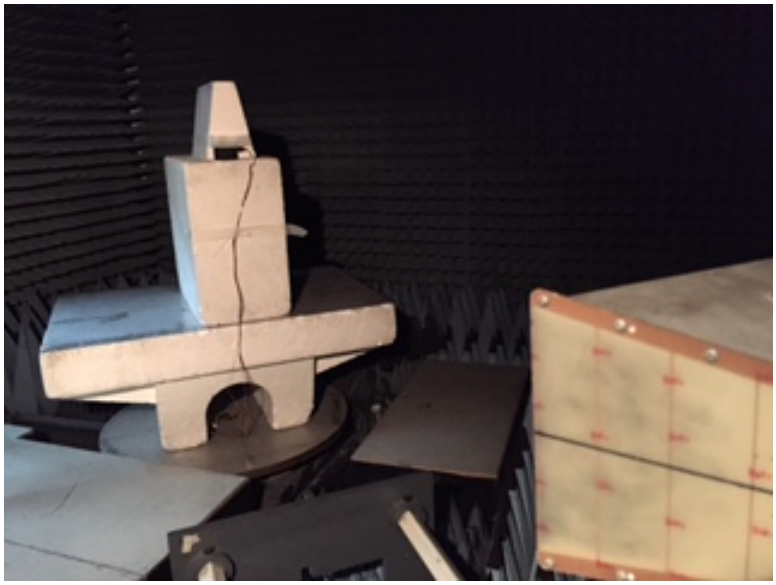
8.1.3.6 The worst test results with respect to the limits were recorded in Table 8.1.3 and shown in the associated plots.

Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Figure 8.1.1 Setup for carrier field strength measurements

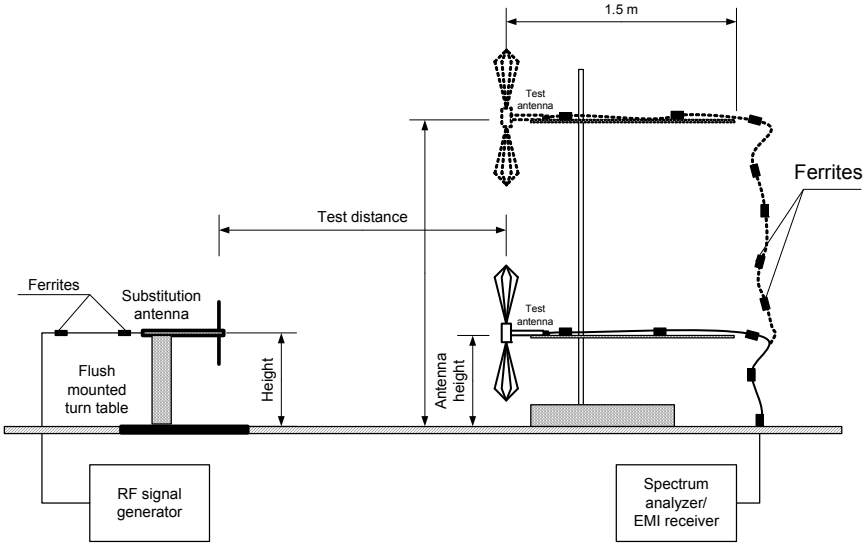


Photograph 8.1.1 Setup for carrier field strength measurements

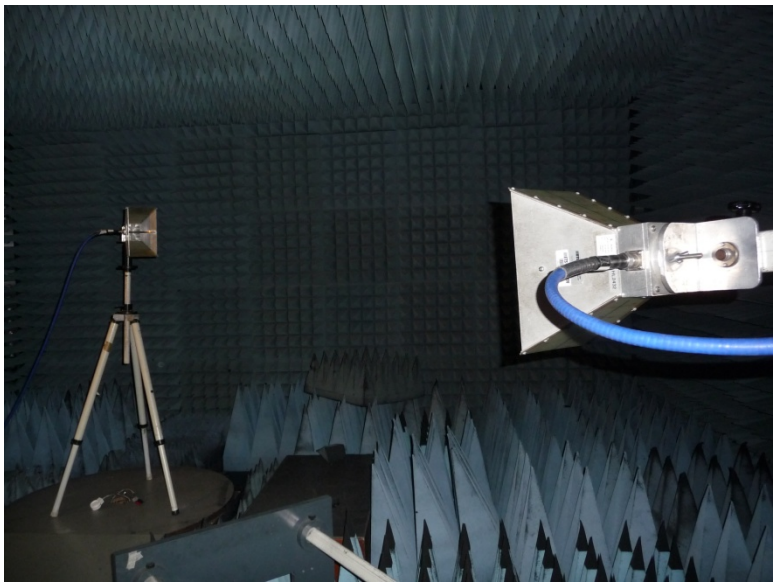


Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Figure 8.1.2 Setup for substitution EIRP measurements



Photograph 8.1.2 Setup for substitution EIRP measurements



Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

Table 8.1.2 Transmitter carrier field strength

ASSIGNED FREQUENCY RANGE: 1710-1785 MHz
TEST SITE: Fully anechoic chamber
TEST DISTANCE: 3 m
EUT HEIGHT: 1.5 m
TEST ANTENNA HEIGHTS RANGE: 1.0 – 1.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3 MHz
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)
MODULATION: GMSK
EUT POSITION: 3 ortogonal positions (see Note)

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Mid carrier frequency (Channel number 698)							
1747.5	124.1	125.23	-1.13	1000	Horizontal	1.5	134

Note: Maximum value was obtained in the EUT Z-axis position
*- Margin = Field strength – calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

Table 8.1.3 Transmitter carrier output power

TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 1.5 m
TEST ANTENNA HEIGHTS RANGE: 1.0 – 1.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3 MHz
SUBSTITUTION ANTENNA TYPE: Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polariz.	RF generator output, dBm	Ant gain, dBi	Cable loss, dB	EIRP, dBm	Output power	Limit, dBm	Verdict
Mid carrier frequency (Channel number 698)										
1747.5	124.1	1000	Horiz.	29.5	5.56	5.6	29.46	27.46	30	Pass

*-Output power, dBm=EIRP, dBm – Antenna gain (G=2 dBi)

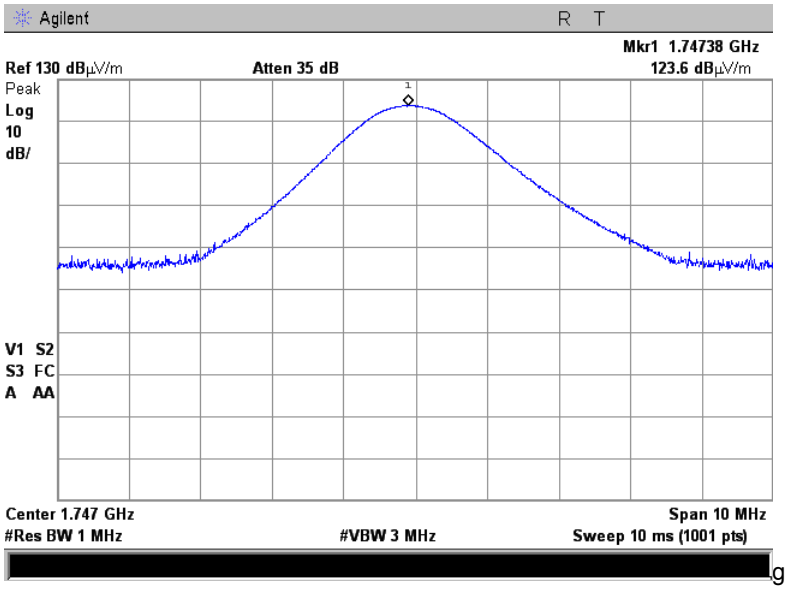
Reference numbers of test equipment used

HL 0567	HL 0661	HL 2432	HL 3615	HL 3818	HL 4114	HL 4276	HL 4278	

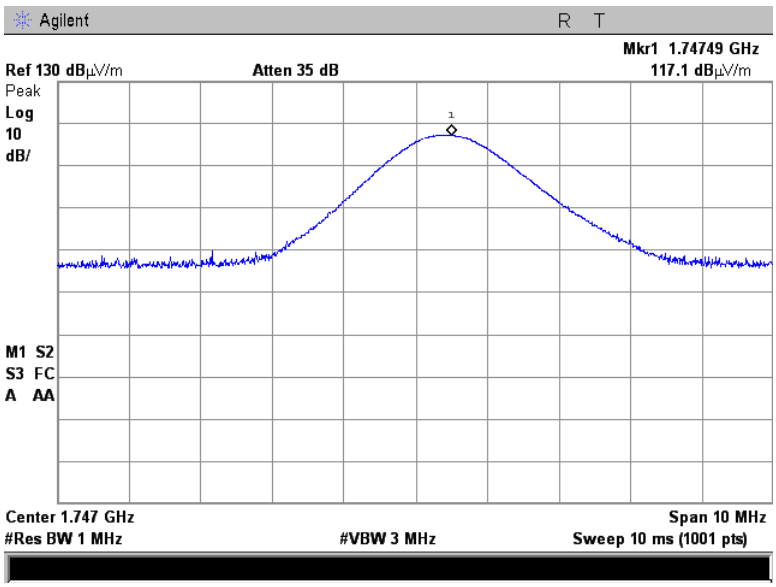
Full description is given in Appendix A.

Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Plot 8.1.1 Transmitter carrier field strength at mid frequency, vertical antenna polarization, X-axis position

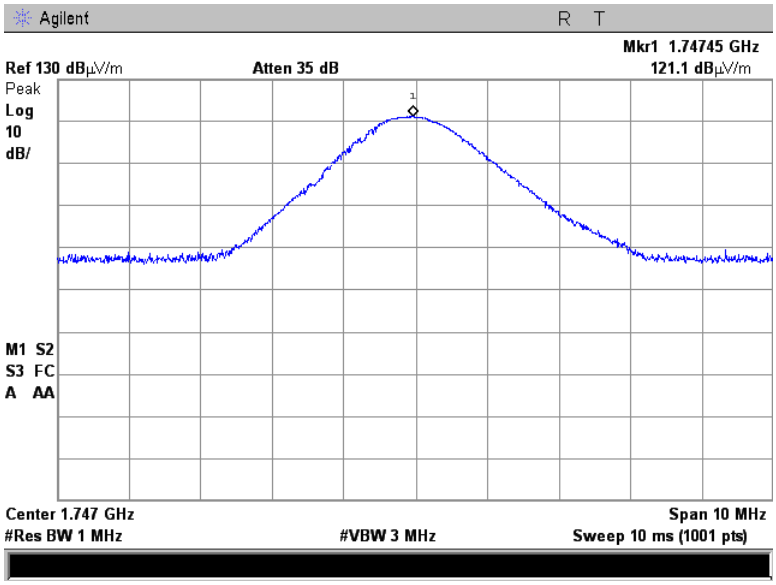


Plot 8.1.2 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, X-axis position

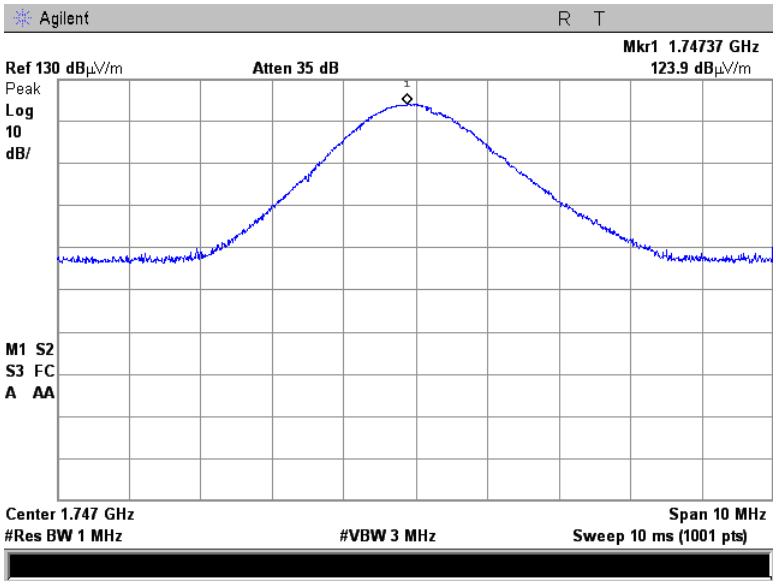


Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Plot 8.1.3 Transmitter carrier field strength at mid frequency, vertical antenna polarization, Y-axis position

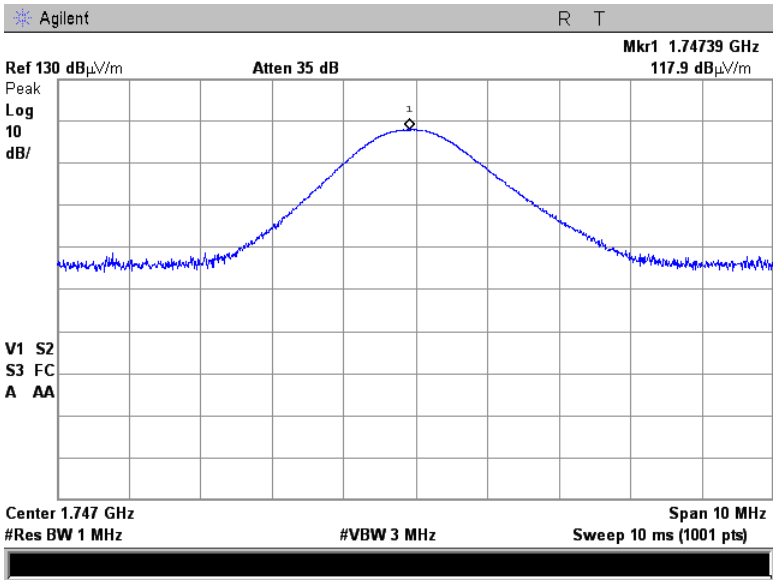


Plot 8.1.4 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, Y-axis position

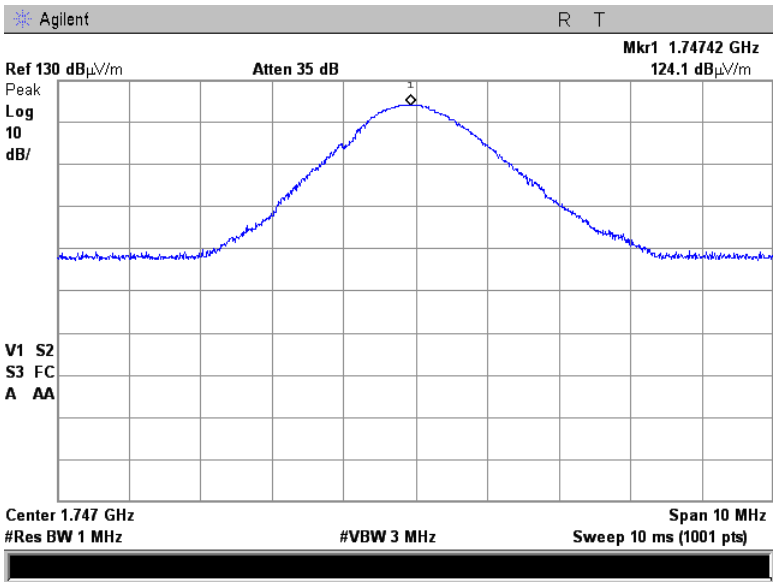


Test specification:	Equivalent isotropically radiated power		
Test procedure:	EN 301 511 Section 5.3.5		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Plot 8.1.5 Transmitter carrier field strength at mid frequency, vertical antenna polarization, Z-axis position



Plot 8.1.6 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, Z-axis position



Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

8.2 Effective radiated power of transmitter spurious emission

8.2.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 8.2.1.

Table 8.2.1 Radiated spurious emission test limits

Frequency, MHz	Operating mode		Standby mode	
	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*
30 - 880	- 36	61.38	- 57	40.38
880-915	-36	61.38	-59	38.38
915-1000	-36	61.38	-57	40.38
1000 - 1710	- 30	67.38	- 47	50.38
1710-1785	- 36	61.38	-53	44.38
1785 - 4000	- 30	67.38	- 47	50.38

*- Equivalent field strength limit was calculated from maximum allowed EIRP of spurious as follows: E=sqrt(30×P)/r, where P is EIRP in Watts and r is antenna to EUT distance in meters.

8.2.2 Test procedure for spurious emission field strength measurements in transmit mode

8.2.2.1 The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

8.2.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

8.2.2.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the specified in Table 7.4.2 range in both, vertical and horizontal, polarizations.

8.2.2.4 The worst test results (the lowest margins) were recorded in Table 8.2.2 and shown in the associated plots.

8.2.3 Test procedure for spurious emission field strength measurements in idle mode

8.2.3.1 The EUT was set up as shown in Figure 8.2.1, energized and the performance check was conducted.

8.2.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the specified in Table 7.4.4 range in both, vertical and horizontal, polarizations.

8.2.3.3 The worst test results (the lowest margins) were recorded in Table 8.2.4 and shown in the associated plots.

8.2.4 Test procedure for substitution ERP measurements of spurious emission

8.2.4.1 The test equipment was set up as shown in Figure 8.2.2 and energized.

8.2.4.2 RF signal generator was set to the frequency of investigated spurious emission and the RF output level was preliminary adjusted to produce the same field strength as it was measured from EUT.

8.2.4.3 The test antenna height was swept throughout the specified in Table 7.4.2, Table 7.4.4 range to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from EUT.

8.2.4.4 The above procedure was performed in both, horizontal and vertical, polarizations of the test antenna.

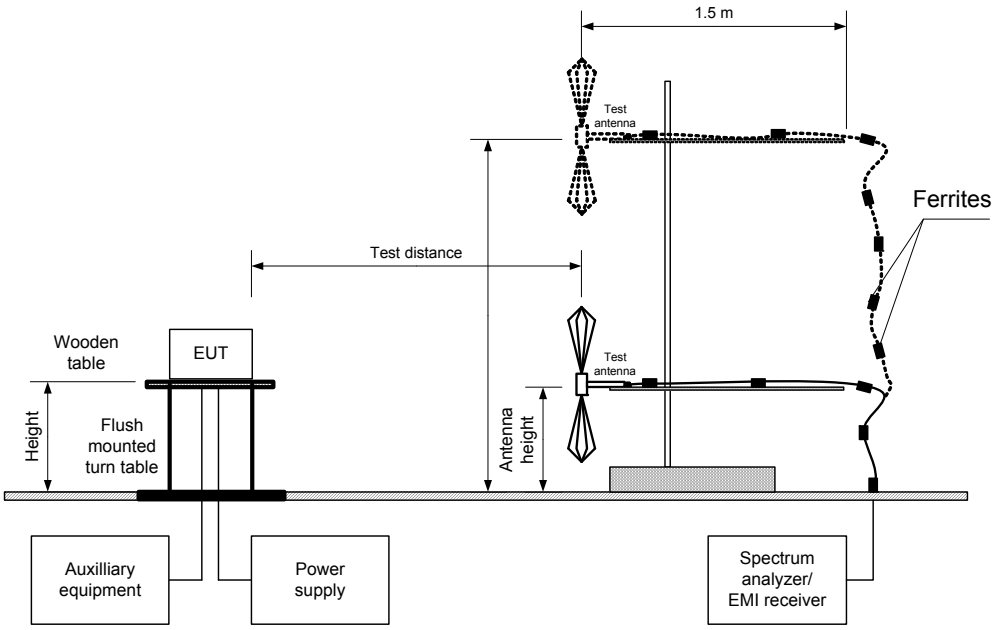
8.2.4.5 The ERP of spurious emissions was calculated as a sum of signal generator output power in dBm and antenna gain in dBd reduced by cable loss in dB.

8.2.4.6 The above procedure was repeated at the rest of investigated frequencies.

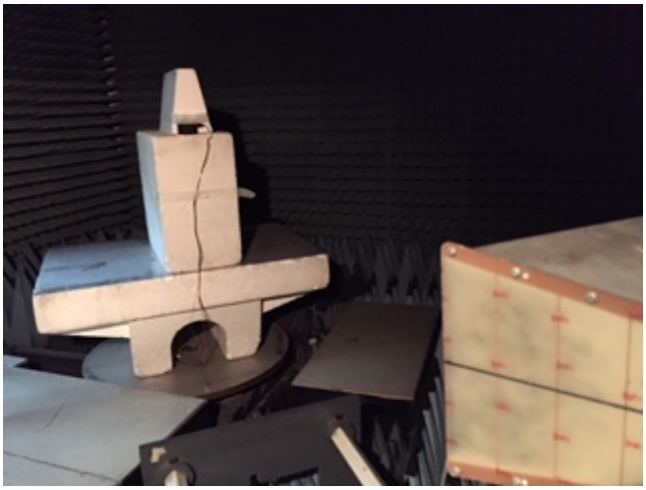
8.2.4.7 The worst test results (the lowest margins) were recorded in Table 8.2.3.

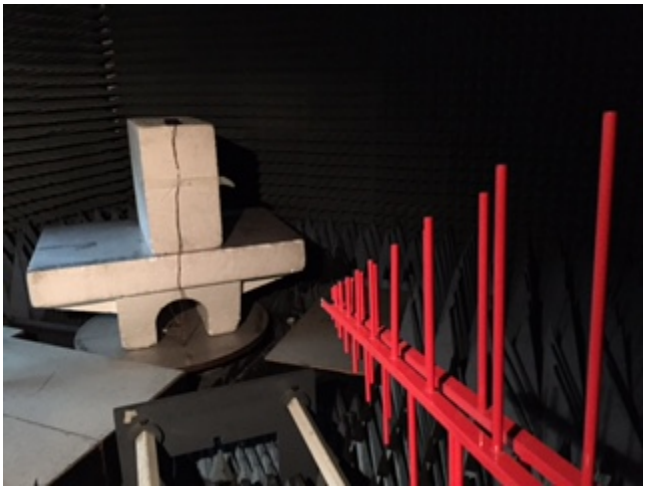
Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

Figure 8.2.1 Setup for spurious emission field strength measurements



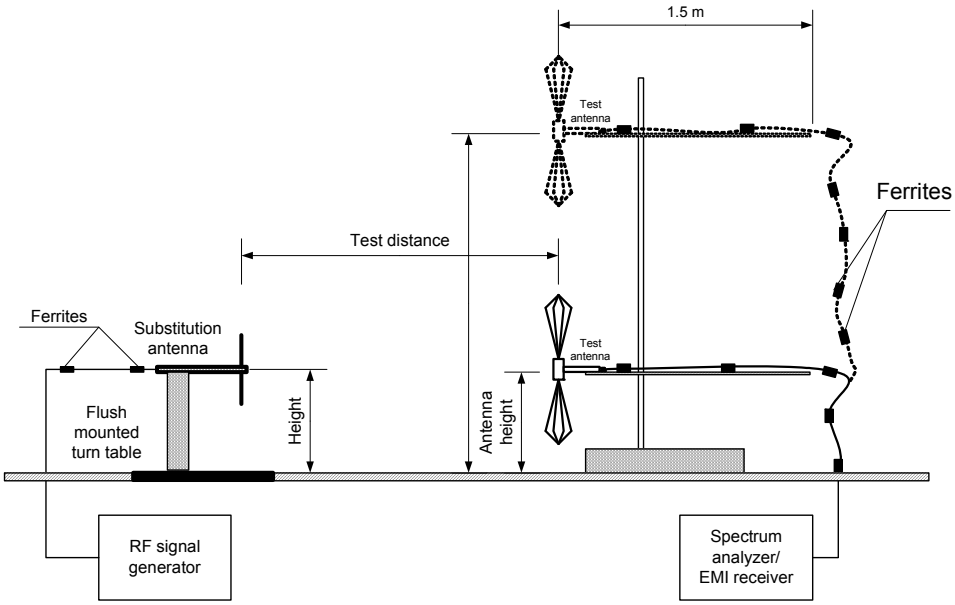
Photograph 8.2.1 Setup for spurious emission field strength measurements



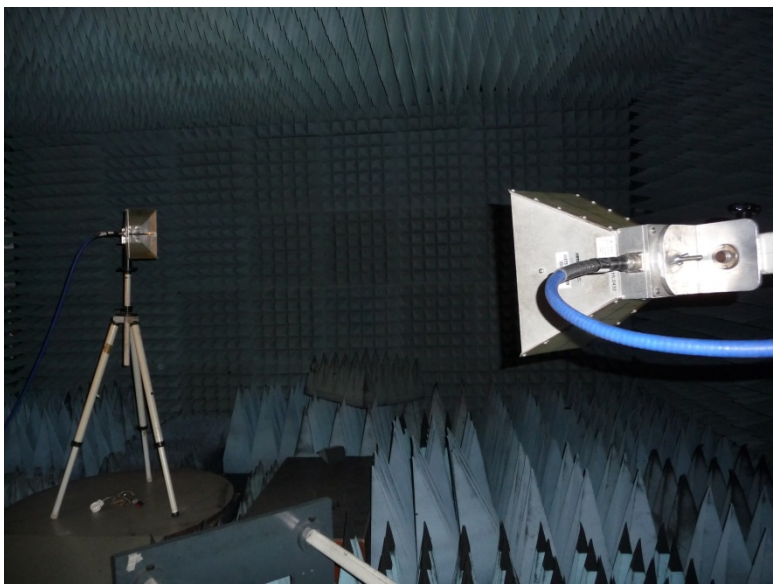


Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Figure 8.2.2 Setup for substitution ERP measurements of spurious



Photograph 8.2.2 Setup for substitution ERP measurements of spurious



Test specification:	**Effective radiated power of transmitter spurious emissions**		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

Table 8.2.2 Spurious emission field strength test results in transmit mode

ASSIGNED FREQUENCY RANGE:	1710 -1785 MHz
EUT ANTENNA:	Integral
TEST DISTANCE:	3 m
EUT HEIGHT:	1.5 m
TEST ANTENNA HEIGHTS RANGE:	1.0 – 1.8 m
INVESTIGATED FREQUENCY RANGE:	30 – 4000 MHz
DETECTOR USED:	Quasi-peak (30 – 1000 MHz) Peak (above 1000 MHz)
RESOLUTION BANDWIDTH:	30 MHz – 500 MHz: 100 kHz (3 dB RBW) 500 MHz – 1000 MHz: 3.0 MHz (3 dB RBW) above 1000 MHz: 3.0 MHz (3 dB RBW)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)
MODULATION:	GMSK
CHANNEL NUMBER:	698

Frequency, MHz	Field strength, dB(uV/m)	Limit, dB(uV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Mid carrier frequency							
1805.0	52.2	67.3	-14.9	1000	Horizontal	1.5	130

*- Margin = Field strength of spurious – calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

Test specification:	**Effective radiated power of transmitter spurious emissions**		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

Table 8.2.3 ERP of spurious emission test results in transmit mode

ASSIGNED FREQUENCY RANGE: 1710-1785 MHz
TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 1.5 m
TEST ANTENNA HEIGHTS RANGE: 1.0 – 1.8 m
DETECTOR USED: Quasi-peak (25 – 1000 MHz)
Peak (above 1000 MHz)
RESOLUTION BANDWIDTH: 30 MHz – 500 MHz: 100 kHz (3 dB RBW)
500 MHz – 1000 MHz: 3.0 MHz (3 dB RBW)
above 1000 MHz: 3.0 MHz (3 dB RBW)
VIDEO BANDWIDTH: ≥ Resolution bandwidth
SUBSTITUTION ANTENNA TYPE: Biconical (25 MHz – 30 MHz)
Tunable dipole (30 MHz – 1000 MHz)
Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(uV/m)	RBW, kHz	Antenna polarization	RF generator output, dBm	Ant gain, dBd	Cable loss, dB	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Mid carrier frequency										
1805	52.2	1000	H	-50	6.6	1.2	-44.6	-30	-14.6	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

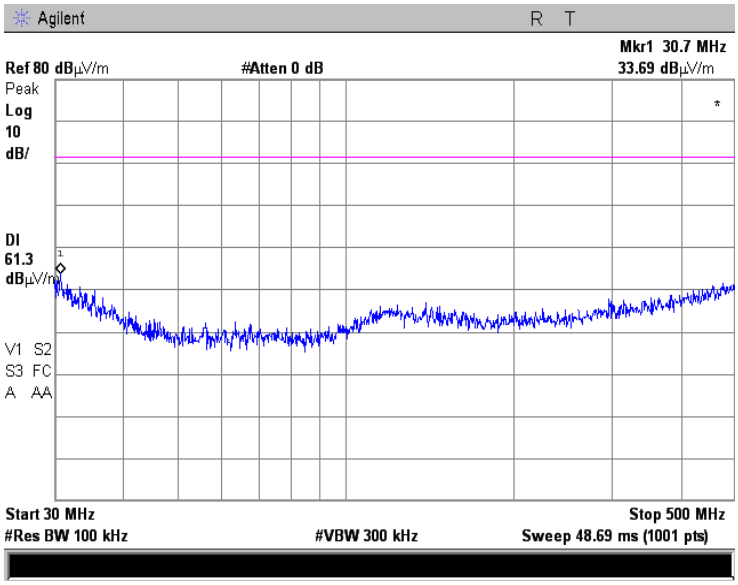
HL 0521	HL 0567	HL 0661	HL 1984	HL 3615	HL 4114	HL 4224	HL 4353

Full description is given in Appendix A.

Test specification:	**Effective radiated power of transmitter spurious emissions**		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

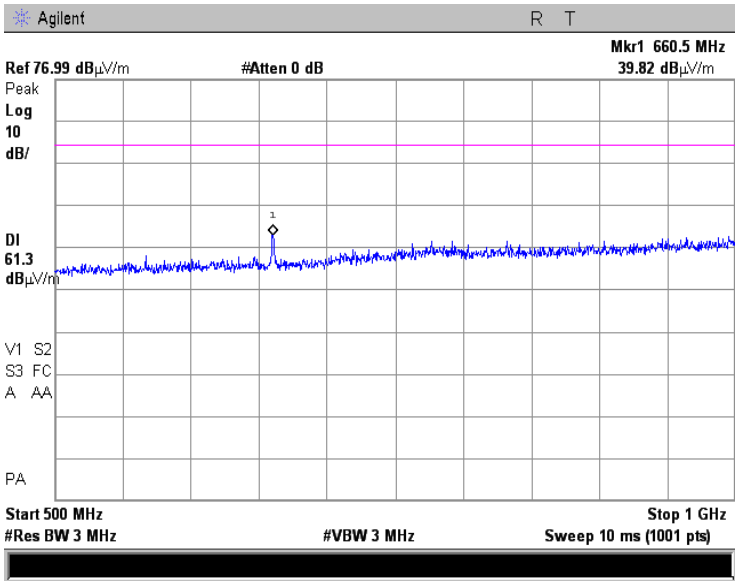
Plot 8.2.1 Radiated emission measurements from 30 to 500 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 8.2.2 Radiated emission measurements from 500 to 1000 MHz

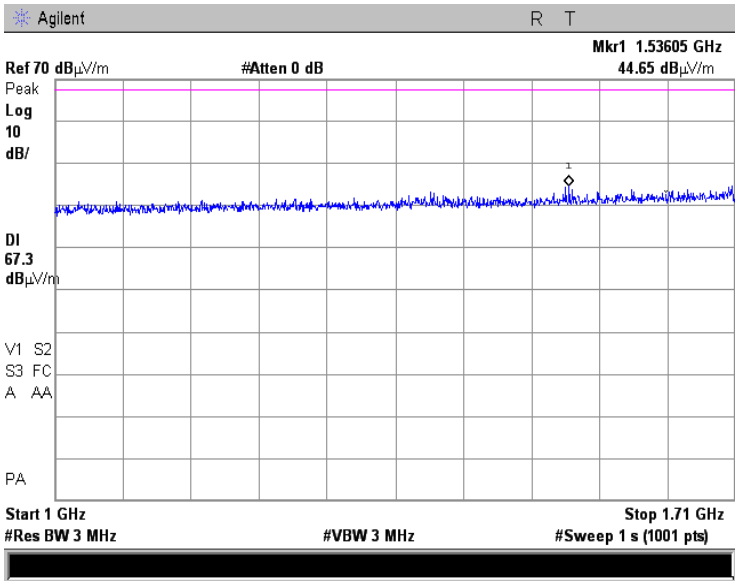
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

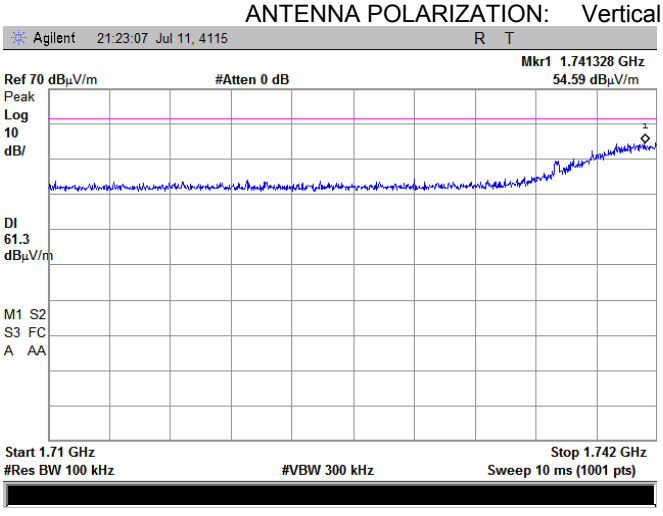
Plot 8.2.3 Radiated emission measurements from 1.0 to 1.710 MHz

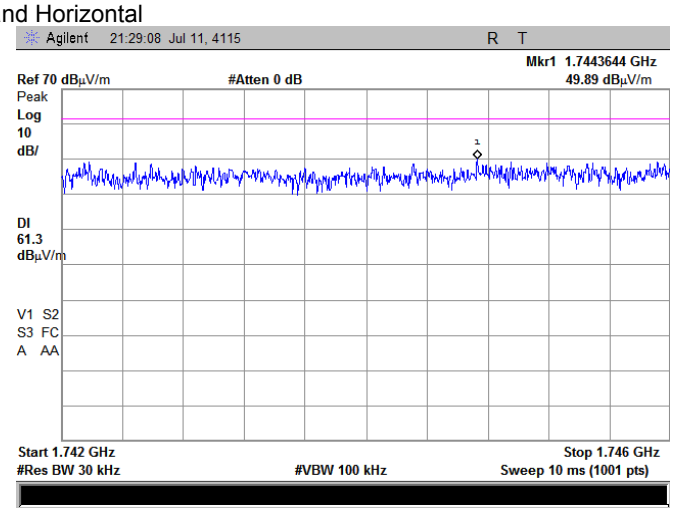
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 8.2.4 Radiated emission measurements from 1.71 to 1745.7 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

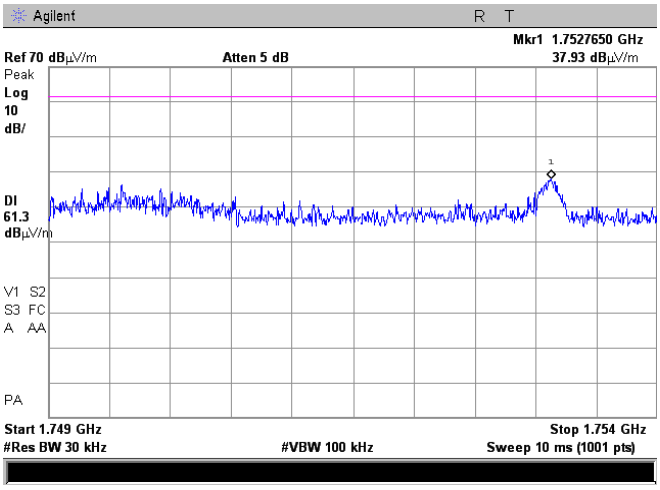


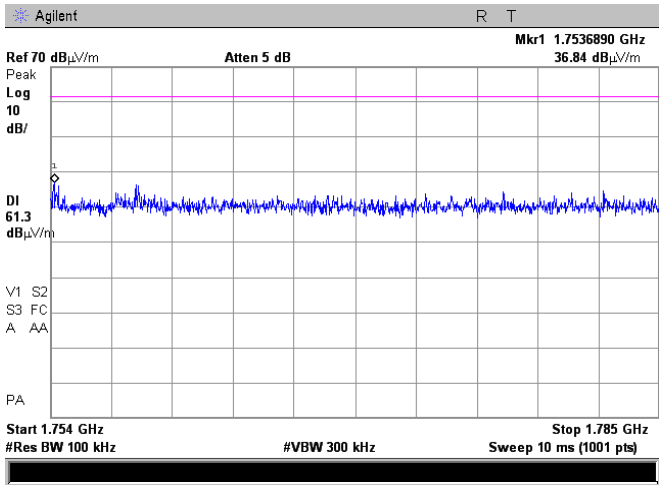


Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Plot 8.2.5 Radiated emission measurements from 1749 to 1785 MHz

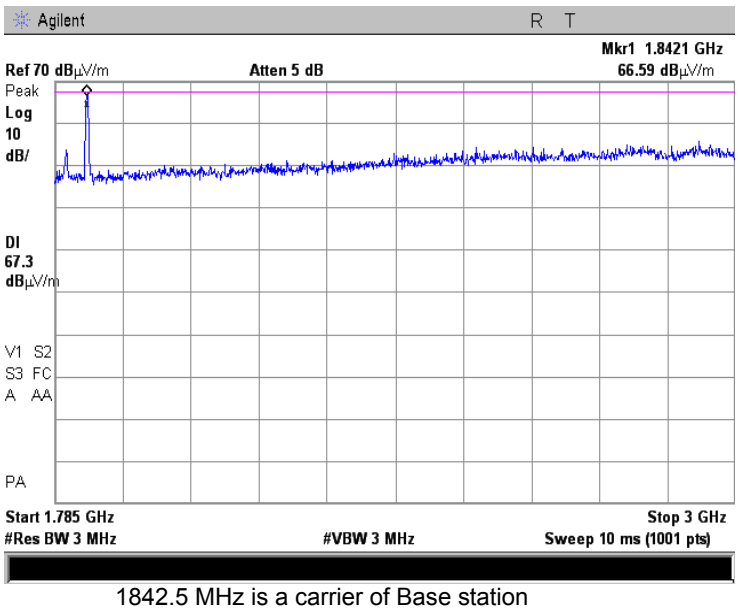
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal





Plot 8.2.6 Radiated emission measurements from 1785 to 3000 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

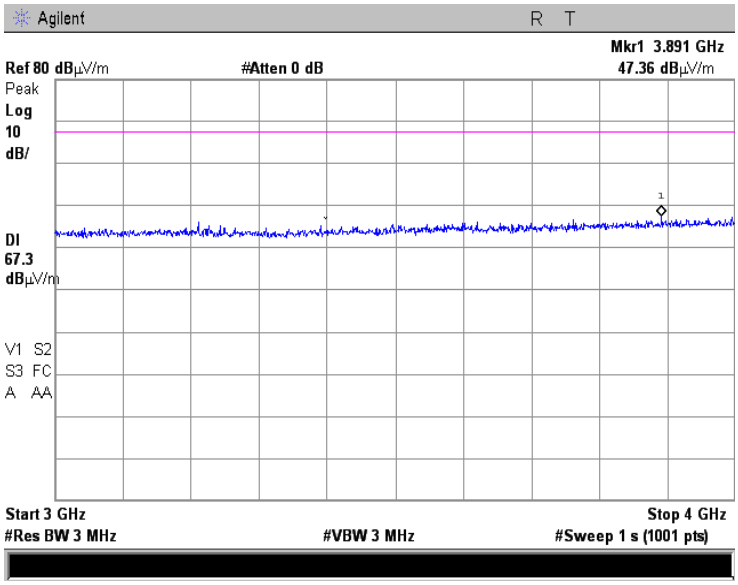


1842.5 MHz is a carrier of Base station

Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

Plot 8.2.7 Radiated emission measurements from 3.0 to 4.0 MHz at mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 2G module			

Table 8.2.4 Spurious emission field strength test results in idle mode

ASSIGNED FREQUENCY RANGE:	1710-1785 MHz
EUT ANTENNA:	Integral
TEST DISTANCE:	3 m
EUT HEIGHT:	1.5 m
TEST ANTENNA HEIGHTS RANGE:	1.0 – 1.8 m
INVESTIGATED FREQUENCY RANGE:	30 – 4000 MHz
DETECTOR USED:	Quasi-peak (30 – 1000 MHz) Peak (above 1000 MHz)
RESOLUTION BANDWIDTH:	30 MHz – 500 MHz: 100 kHz (3 dB RBW) 500 MHz – 1000 MHz: 3.0 MHz (3 dB RBW) above 1000 MHz: 3.0 MHz (3 dB RBW)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(uV/m)	Limit, dB(uV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
No signals were found							

Verdict: Pass

Reference numbers of test equipment used

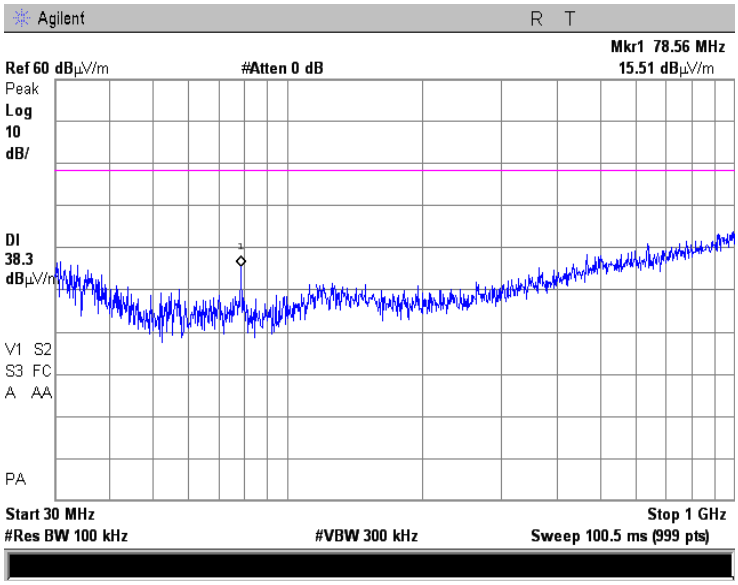
HL 2432	HL 2697	HL 2909	HL 3389	HL 4347	HL 4721	HL 4932	

Full description is given in Appendix A.

Test specification:	Effective radiated power of transmitter spurious emissions		
Test procedure:	EN 301 511 Sections 5.3.16, 5.3.17		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 2G module			

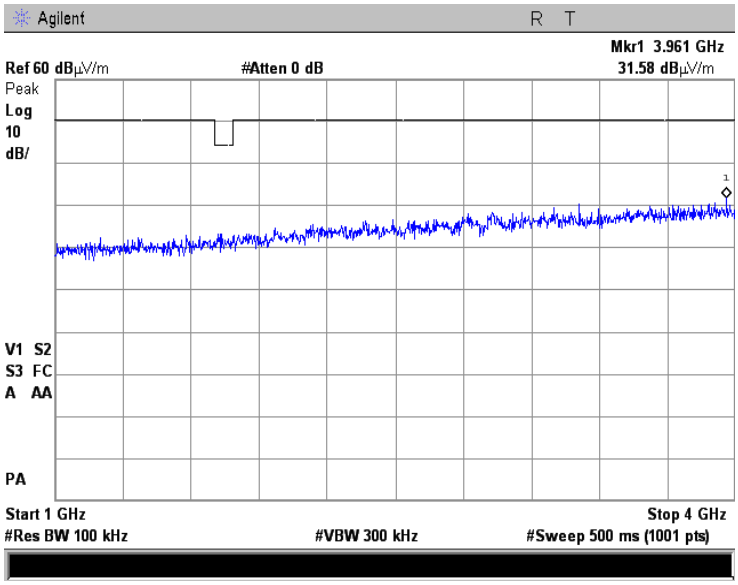
Plot 8.2.8 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Semi Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 8.2.9 Radiated emission measurements from 1 to 4 GHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

9 Transmitter parameters according to EN 301 908-2 standard

9.1 Maximum output power of middle carrier

9.1.1 General

This test was performed to measure equivalent isotropically radiated power emanated by transmitter at carrier frequency. Specification test limits are given in Table 9.1.1.

Table 9.1.1 Output power limit, Band I, power class 3

Assigned frequency band, MHz	Output power dBm	Equivalent field strength limit @ 3m, dB(μV/m)*
1920-1980 MHz	24 (+1.7/-3.7dB)	121.23

*- Equivalent field strength limit was calculated from maximum allowed EIRP of carrier as follows: E=sqrt(30×P)/r, where P is EIRP in Watts and r is antenna to EUT distance in meters.EIRP=Output power+Gain antenna (2 db)

9.1.2 Test procedure for field strength measurements

9.1.2.1 The EUT was set up as shown in Figure 9.1.1, energized and the performance check was conducted.

9.1.2.2 The field strength of the EUT carrier frequency was measured with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiaion the turntable was rotated 360^0, the measuring antenna height was swept throughout the range, specified in Table 9.1.2, in both vertical and horizontal polarizations.

9.1.2.3 The worst test results with respect to the limits were recorded in Table 9.1.2 and shown in the associated plots.

9.1.3 Test procedure for substitution EIRP measurements

9.1.3.1 The test equipment was set up as shown in Figure 9.1.2 and energized.

9.1.3.2 RF signal generator was set to the EUT carrier frequency and the RF output level was preliminary adjusted to produce the same field strength as it was measured from the EUT.

9.1.3.3 The test antenna height was swept throughout the specified in Table 9.1.2 range to find maximum emission from substitution antenna and RF signal generator output was fine adjusted to produce the same field strength as it was measured from the EUT.

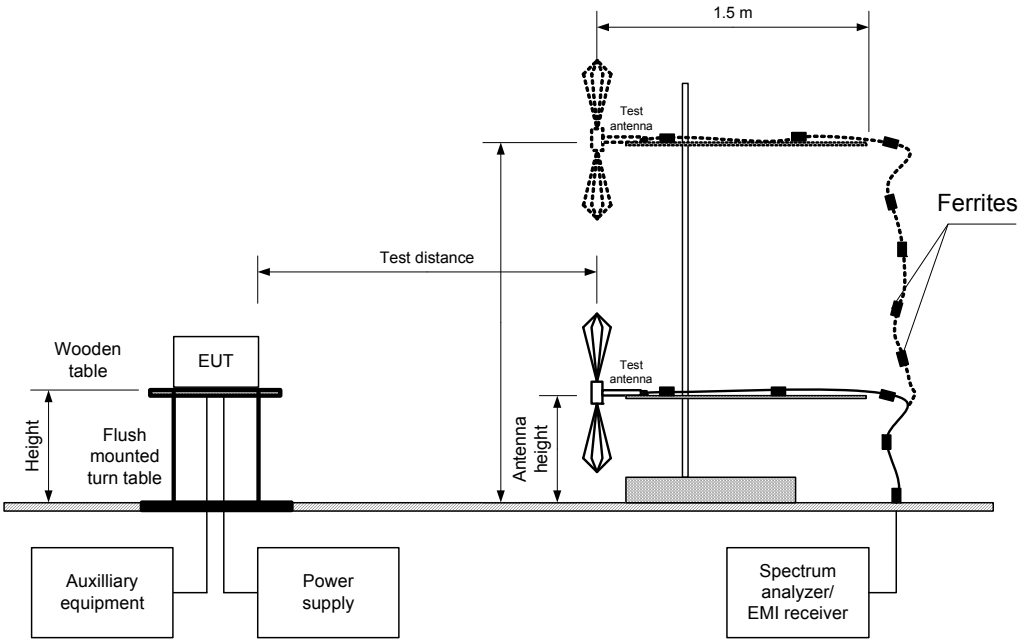
9.1.3.4 The EIRP was calculated as a sum of signal generator output power in dBm and antenna gain in dBi reduced by cable loss in dB.

9.1.3.5 The above procedure was performed in both horizontal and vertical polarizations of the test antenna.

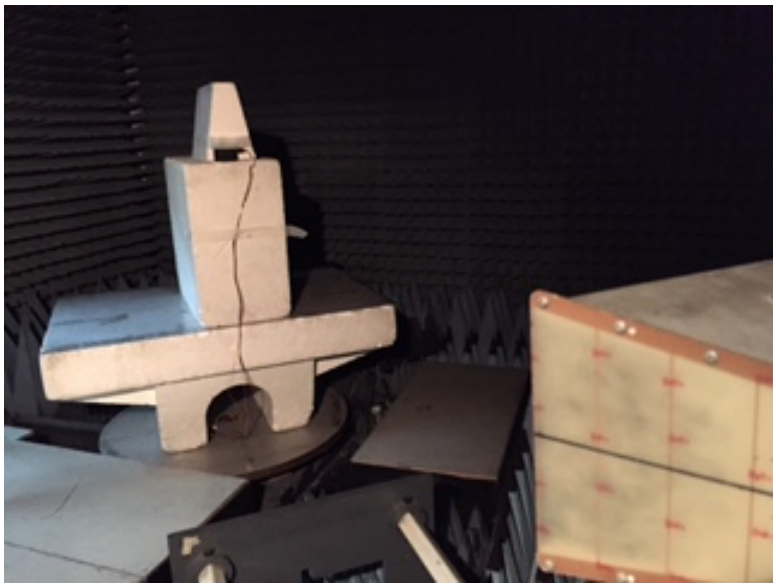
9.1.3.6 The worst test results with respect to the limits were recorded in Table 9.1.3 and shown in the associated plots.

Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Figure 9.1.1 Setup for carrier field strength measurements

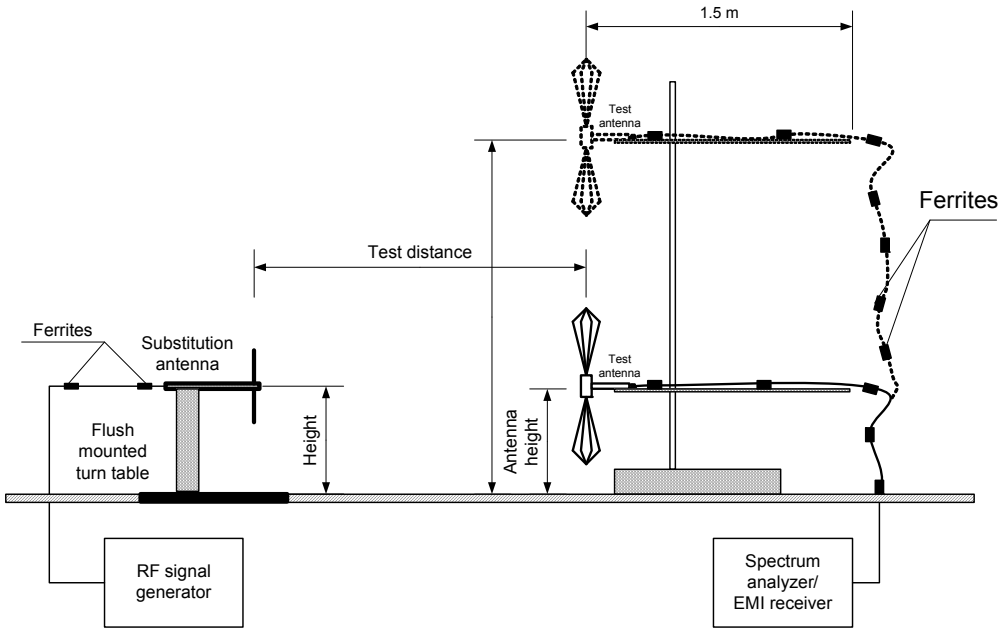


Photograph 9.1.1 Setup for carrier field strength measurements



Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Figure 9.1.2 Setup for substitution EIRP measurements



Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Table 9.1.2 Transmitter carrier field strength

ASSIGNED FREQUENCY RANGE: 1920 – 1980 MHz
TEST SITE: Fully anechoic chamber
TEST DISTANCE: 3 m
EUT HEIGHT: 1.5 m
TEST ANTENNA HEIGHTS RANGE: 1.0 – 1.8 m
DETECTOR USED: Peak
TEST ANTENNA TYPE: Double ridged guide (above 1000 MHz)
MODULATION: GMSK
EUT POSITION: 3 ortogonal positions (see Note)

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
Mid carrier frequency							
1950	121.61	121.23	0.38	1000	Horizontal	1.5	134

Note: Maximum value was obtained in the EUT Z-axis position
*- Margin = Field strength – calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

Table 9.1.3 Transmitter carrier EIRP

TEST DISTANCE: 3 m
SUBSTITUTION ANTENNA HEIGHT: 1.5 m
TEST ANTENNA HEIGHTS RANGE: 1.0 – 1.8 m
DETECTOR USED: Peak
VIDEO BANDWIDTH: 3 MHz
SUBSTITUTION ANTENNA TYPE: Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(μV/m)	RBW, kHz	Antenna polariz.	RF generator output, dBm	Ant gain, dBi	Cable loss, dB	EIRP, dBm	Output power*, dBm	Limit, dBm	Verdict
Mid carrier frequency										
1950	121.61	1000	Horiz.	28	4.51	6	26.51	24.51	24(+1.7/-3.7)	Pass

*-Output power, dBm = EIRP, dBm – Antenna gain (G=2 dBi)

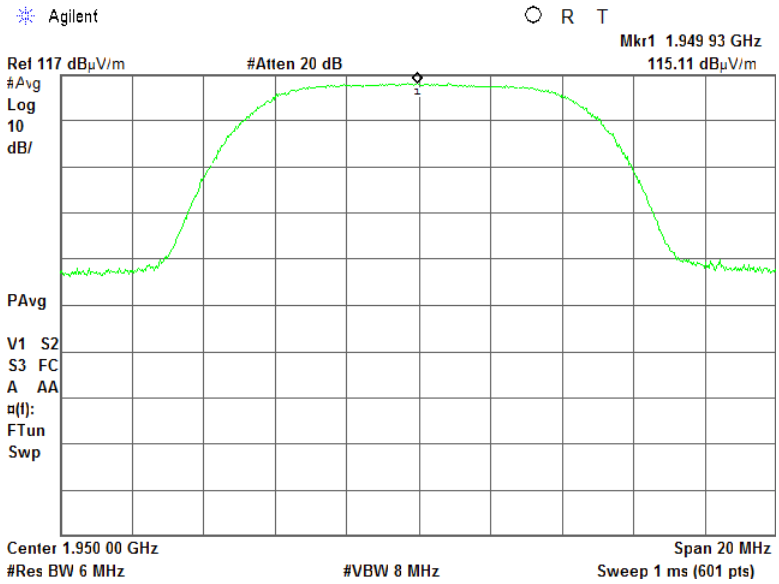
Reference numbers of test equipment used

HL 0567	HL 0661	HL 2432	HL 3615	HL 3818	HL 4114	HL 4276	HL 4278	

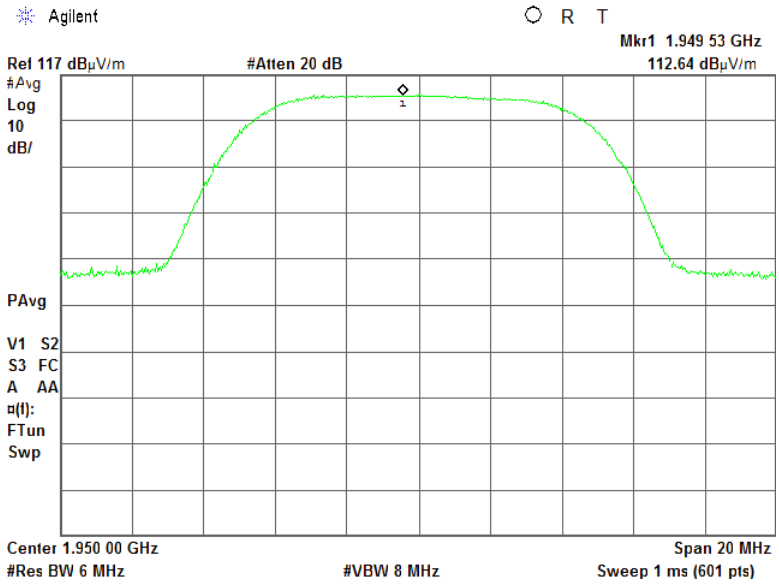
Full description is given in Appendix A.

Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.1.1 Transmitter carrier field strength at mid frequency, vertical antenna polarization, X-axis position

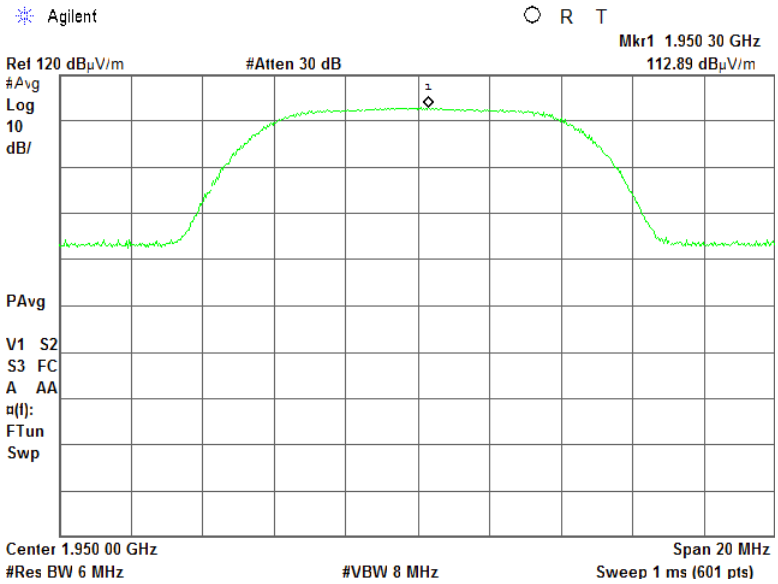


Plot 9.1.2 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, X-axis position

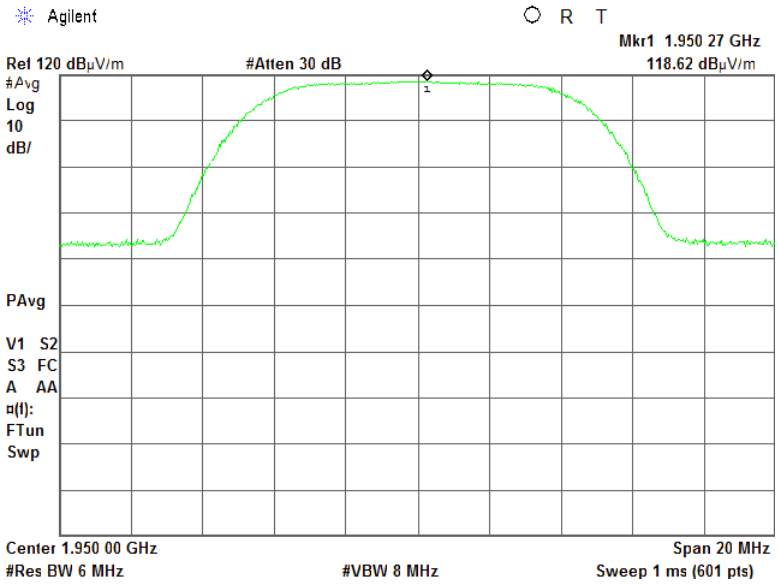


Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.1.3 Transmitter carrier field strength at mid frequency, vertical antenna polarization, Y-axis position

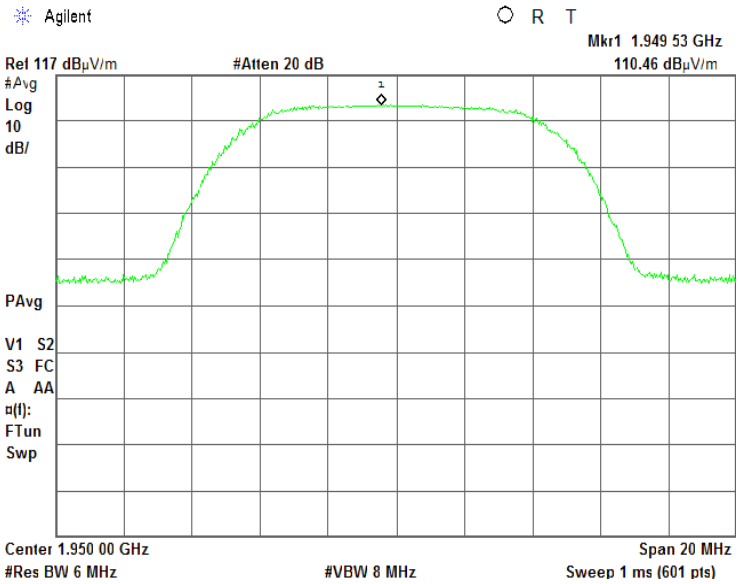


Plot 9.1.4 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, Y-axis position

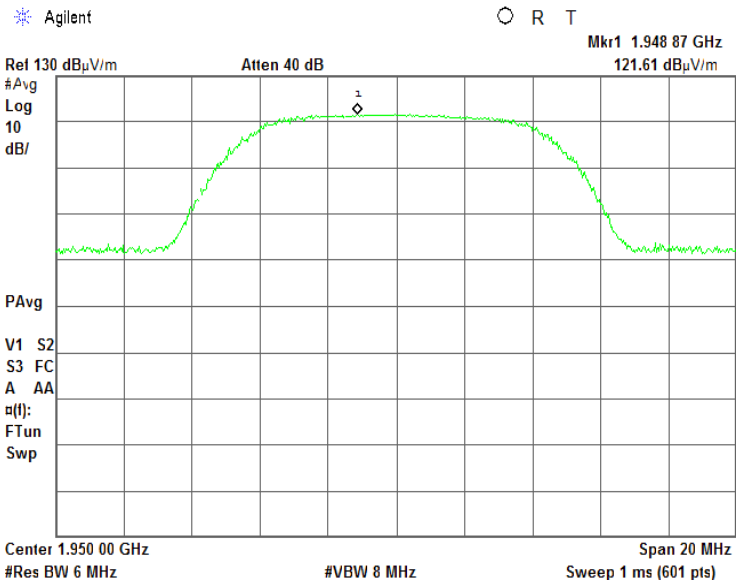


Test specification:	Equivalent isotropically radiated power, EN 301 908-2 section 4.2.2		
Test procedure:	EN 301 908-2 Section 5.3.1		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.1.5 Transmitter carrier field strength at mid frequency, vertical antenna polarization, Z-axis position



Plot 9.1.6 Transmitter carrier field strength at mid frequency, horizontal antenna polarization, Z-axis position



Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

9.2 Effective radiated power of transmitter spurious emission

9.2.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 9.2.1.

Table 9.2.1 Radiated spurious emission test limits

Frequency, MHz	Operating mode		Standby mode	
	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*	EIRP of spurious, dBm	Equivalent field strength limit @ 3m, dB(µV/m)*
0.009 - 30	- 36	61.3	NA	NA
30-791	- 36	61.3	-57	40.3
791-821	-60	37.3	-60	37.3
821-921	-36	61.3	-57	40.3
921-925	-60	37.3	-60	37.3
925-935	-67	30.3	-67	30.3
935-960	-79	18.3	-79	18.3
960-1000	-36	61.3	-57	40.3
1000 - 1805	- 30	67.3	- 47	50.3
1805-1880	-71	26.3	-71	26.3
1880-1920	-30	67.3	-47	50.3
1920-1937.5	-30	67.3	-60	37.3
1937.5-1962.5	NA	NA	-60	37.3
1962.5-1980	-30	67.3	-60	37.3
1980-2100	-30	67.3	-47	50.3
2110-2170	-60	37.3	-60	37.3
2170-2585	-30	67.3	-47	50.3
2585-2690	- 60	37.3	-60	37.3
2690- 12500	- 30	67.3	- 47	50.3

*- Equivalent field strength limit was calculated from maximum allowed EIRP of spurious as follows: E=sqrt(30×P)/r, where P is EIRP in Watts and r is antenna to EUT distance in meters.

9.2.2 Test procedure for spurious emission field strength measurements in transmit mode

9.2.2.1 The EUT was set up as shown in Figure 9.2.1, energized and the performance check was conducted.

9.2.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

9.2.2.3 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the specified in Table 9.2.2 range in both, vertical and horizontal, polarizations.

9.2.2.4 The worst test results (the lowest margins) were recorded in Table 9.2.2 and shown in the associated plots.

9.2.3 Test procedure for spurious emission field strength measurements in idle mode

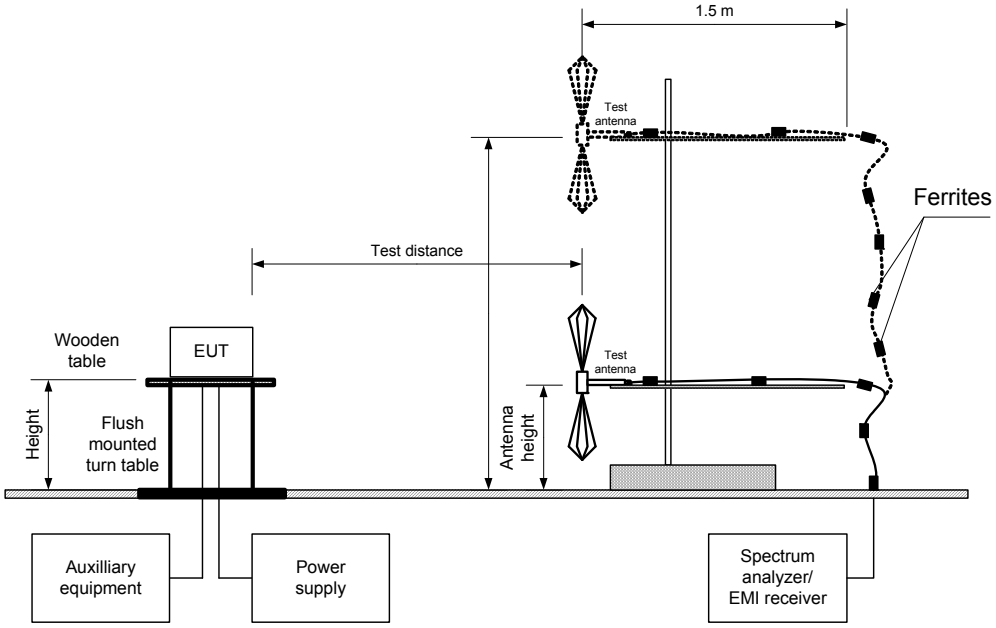
9.2.3.1 The EUT was set up as shown in Figure 9.2.1, energized and the performance check was conducted.

9.2.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer/ EMI receiver. To find maximum radiation the turntable was rotated 360^0, the measuring antenna height was swept throughout the specified in Table 9.2.4 range in both, vertical and horizontal, polarizations.

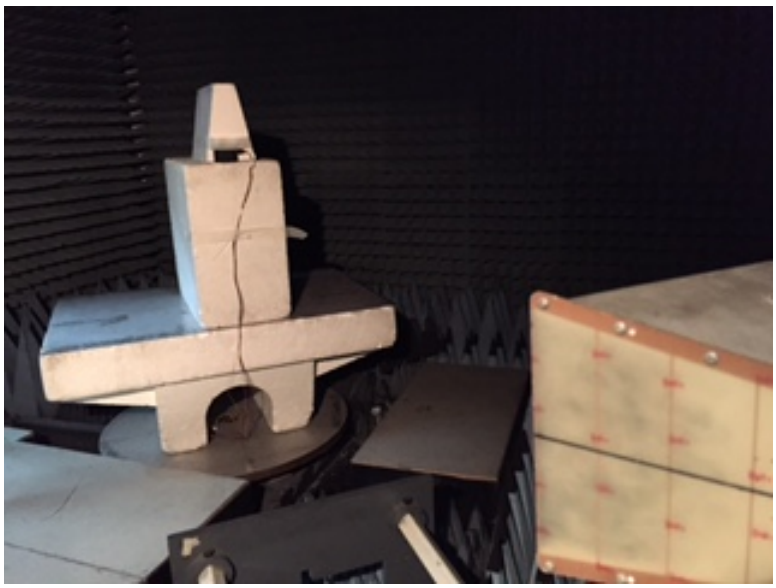
9.2.3.3 The worst test results (the lowest margins) were recorded in Table 9.2.4 and shown in the associated plots.

Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Figure 9.2.1 Setup for spurious emission field strength measurements



Photograph 9.2.1 Setup for spurious emission field strength measurements



Test specification:	**Transmitter spurious emissions, EN 301 908-2 section 4.2.4**		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 3G module			

Table 9.2.2 Spurious emission field strength test results in transmit mode

ASSIGNED FREQUENCY RANGE:	1920 - 1980 MHz
EUT ANTENNA:	Integral
TEST DISTANCE:	3 m
EUT HEIGHT:	1.5 m
TEST ANTENNA HEIGHTS RANGE:	1.0 – 1.8 m
INVESTIGATED FREQUENCY RANGE:	30 – 4000 MHz
DETECTOR USED:	Quasi-peak (30 – 1000 MHz) Peak (above 1000 MHz)
RESOLUTION BANDWIDTH:	30 MHz – 500 MHz: 100 kHz (3 dB RBW) 500 MHz – 1000 MHz: 3.0 MHz (3 dB RBW) above 1000 MHz: 3.0 MHz (3 dB RBW)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)
MODULATION:	GMSK
CHANNEL NUMBER:	698

Frequency, MHz	Field strength, dB(uV/m)	Limit, dB(uV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
No signals were found							

Verdict:Pass

*- Margin = Field strength of spurious – calculated field strength limit.
**- EUT front panel refer to 0 degrees position of turntable.

Reference numbers of test equipment used

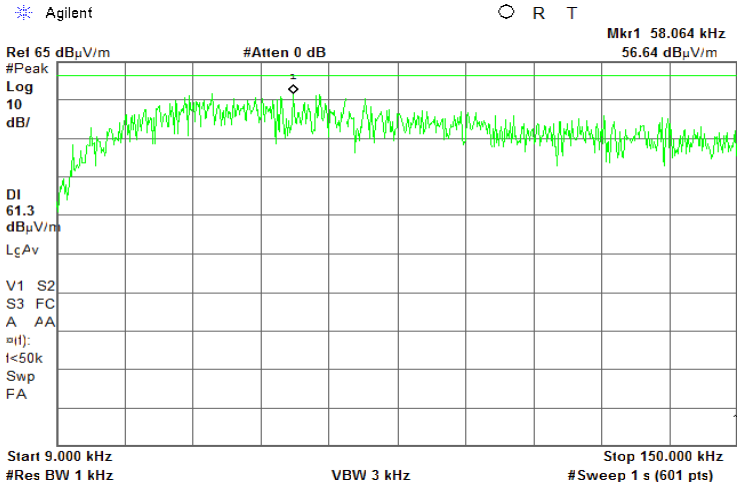
HL 0521	HL 0661	HL 1500	HL 1984	HL 4114	HL 4224	HL 4353	

Full description is given in Appendix A.

Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

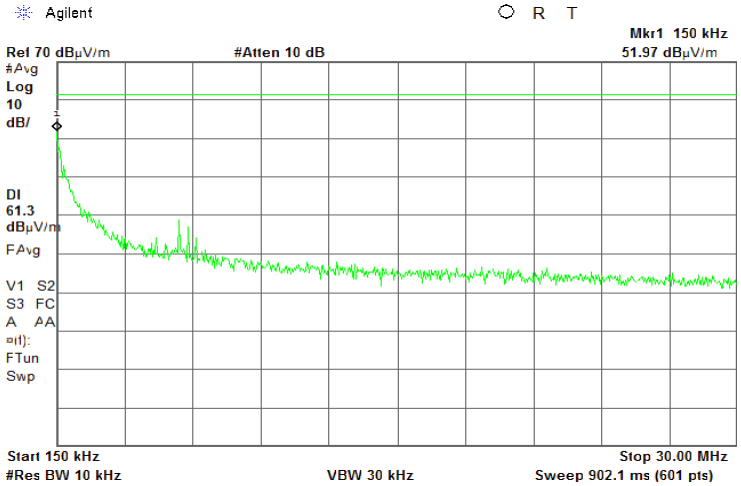
Plot 9.2.1 Radiated emission measurements from 0.009 to 0.150 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m



Plot 9.2.2 Radiated emission measurements from 0.150 to 30 MHz

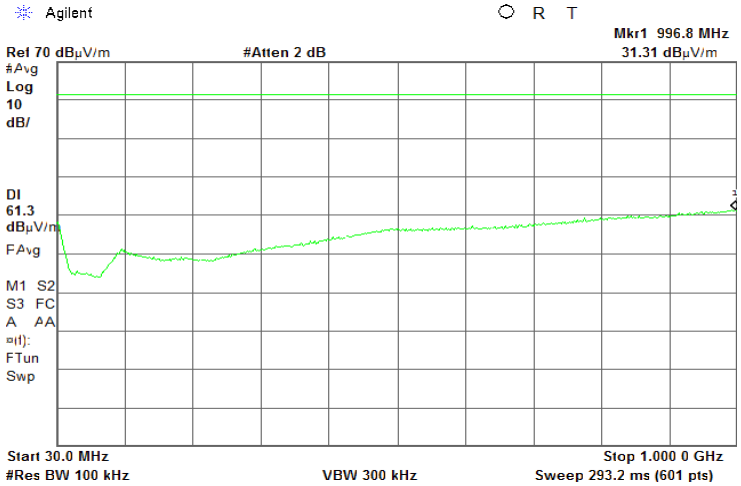
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m

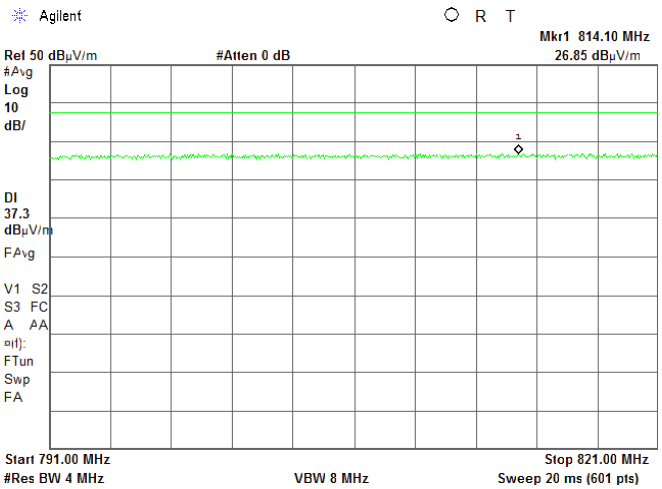


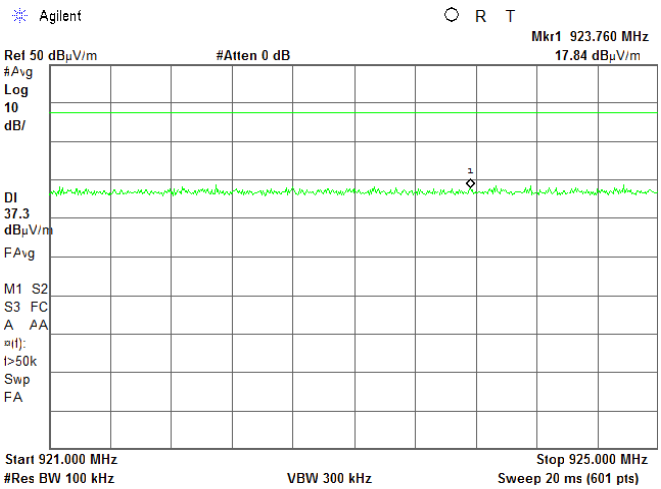
Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.2.3 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



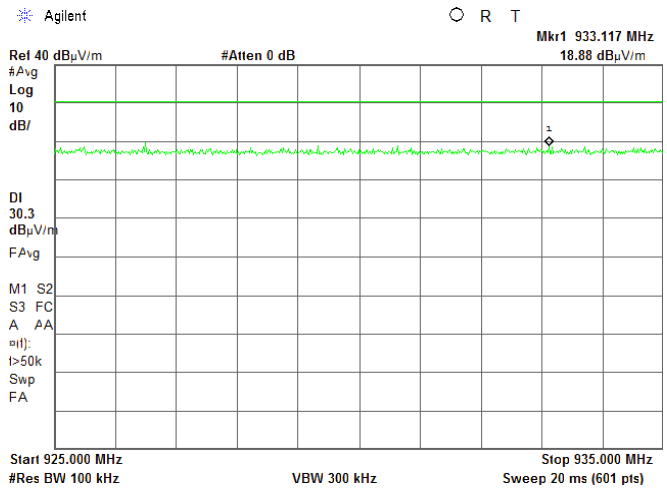


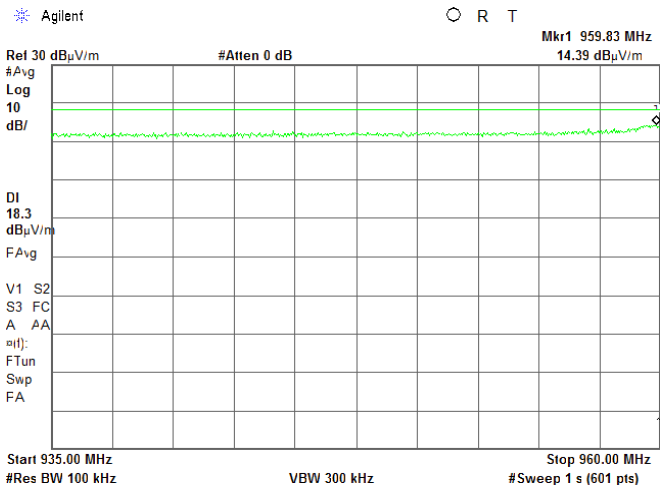


Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.2.4 Radiated emission measurements from 925 to 960 MHz

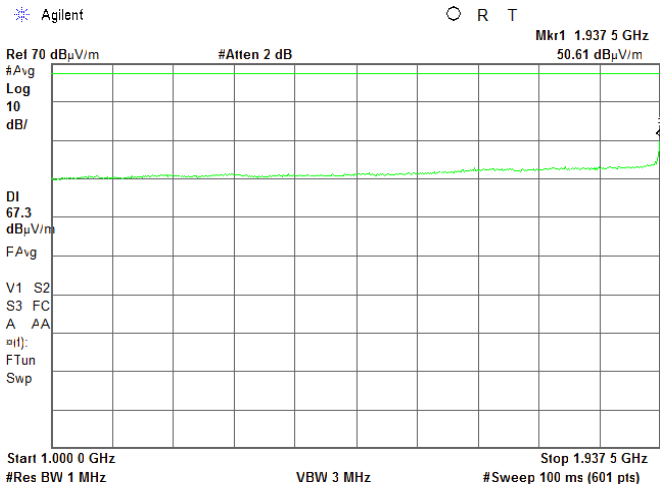
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

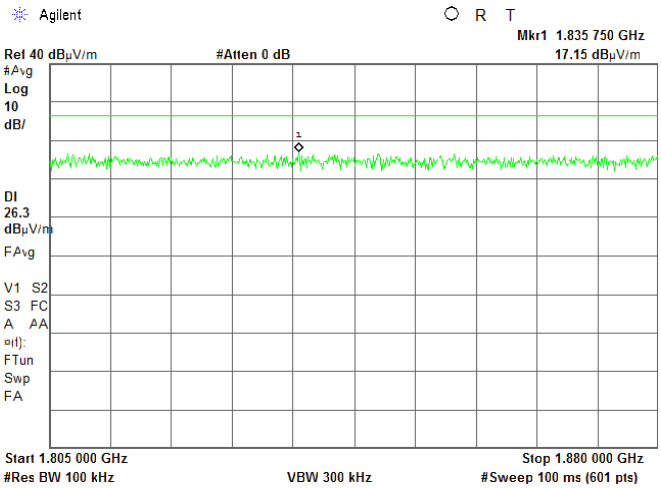




Plot 9.2.5 Radiated emission measurements from 1000 to 1937.5 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

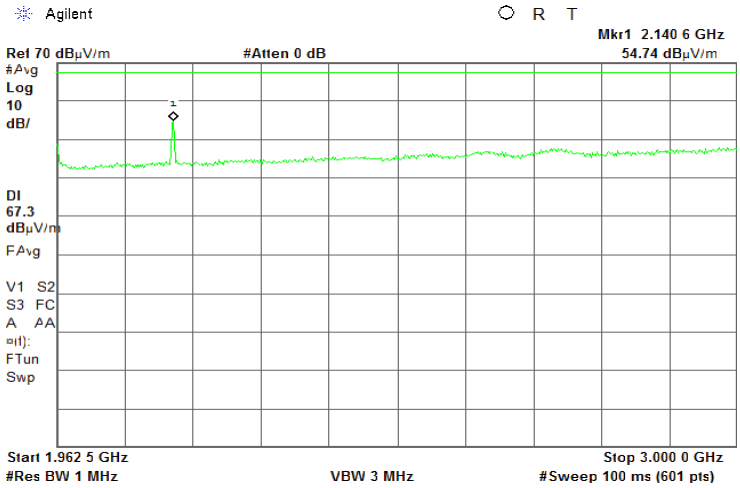


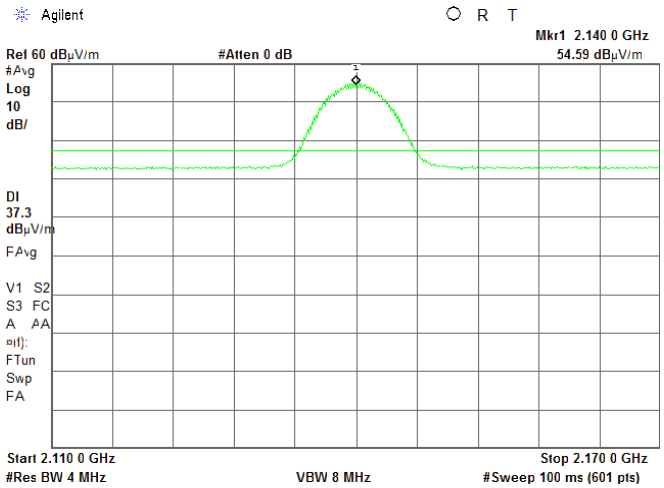


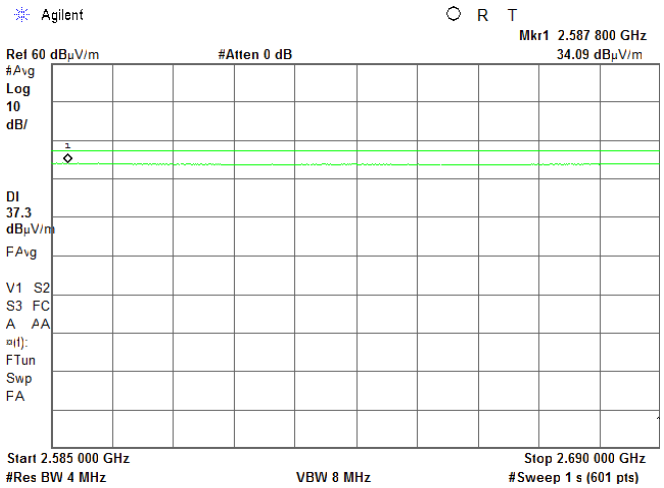
Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.2.6 Radiated emission measurements from 1962.5 to 3000 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal





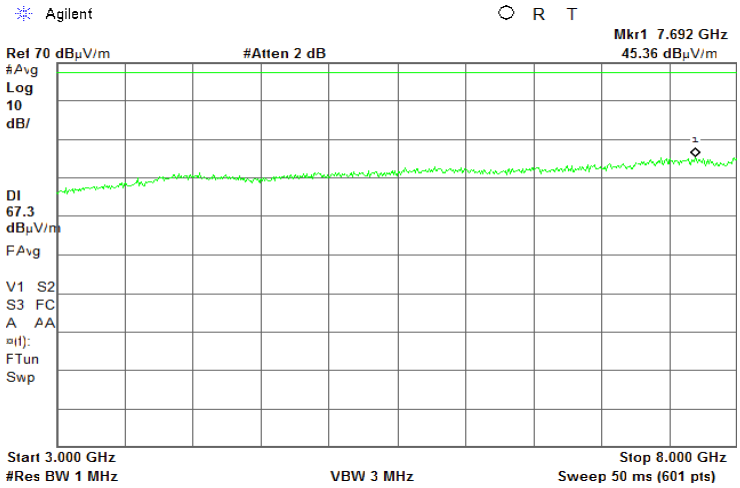


2140 MHz is Base station carrier

Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

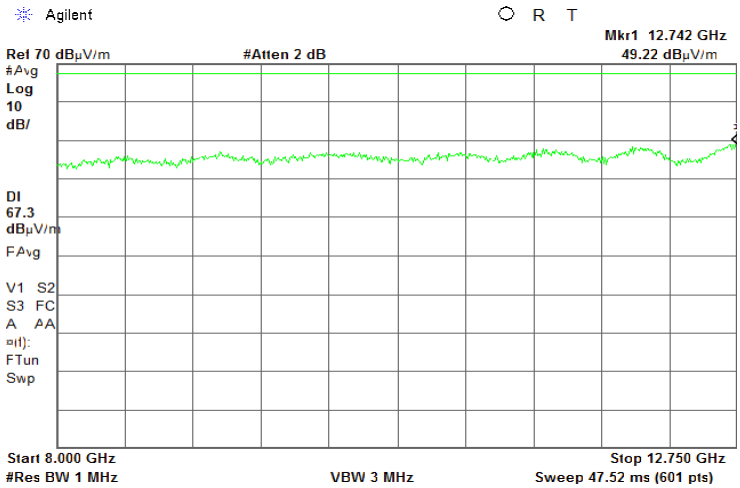
Plot 9.2.7 Radiated emission measurements from 3.0 to 8.0 GHz at mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 9.2.8 Radiated emission measurements from 8.0 to 12.75 GHz at mid carrier frequency

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Table 9.2.3 Spurious emission field strength test results in idle mode

ASSIGNED FREQUENCY RANGE:	2100-2170 MHz
EUT ANTENNA:	Integral
TEST DISTANCE:	3 m
EUT HEIGHT:	1.5 m
TEST ANTENNA HEIGHTS RANGE:	1.0 – 1.8 m
INVESTIGATED FREQUENCY RANGE:	30 – 4000 MHz
DETECTOR USED:	Quasi-peak (30 – 1000 MHz) Peak (above 1000 MHz)
RESOLUTION BANDWIDTH:	30 MHz – 500 MHz: 100 kHz (3 dB RBW) 500 MHz – 1000 MHz: 3.0 MHz (3 dB RBW) above 1000 MHz: 3.0 MHz (3 dB RBW)
VIDEO BANDWIDTH:	≥ Resolution bandwidth
TEST ANTENNA TYPE:	Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)

Frequency, MHz	Field strength, dB(uV/m)	Limit, dB(uV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
No signals were found							

Verdict: Pass

Reference numbers of test equipment used

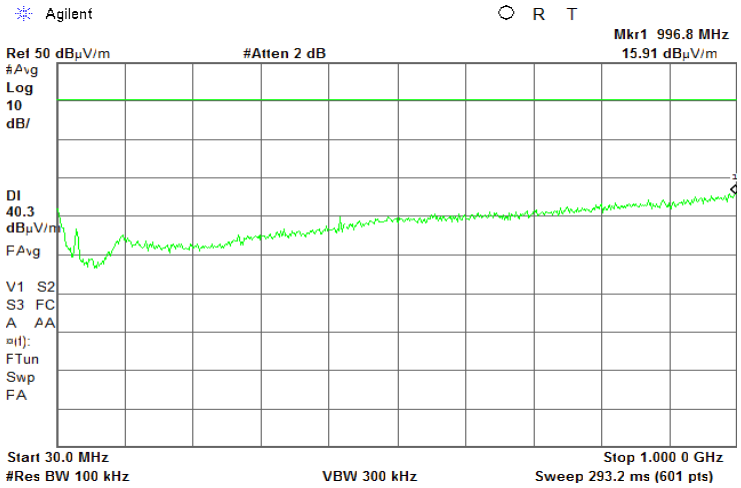
HL 2432	HL 2697	HL 2909	HL 3389	HL 4347	HL 4721	HL 4932	

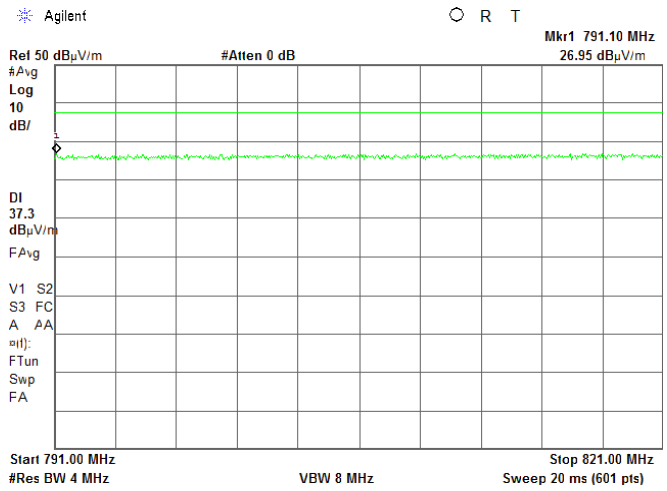
Full description is given in Appendix A.

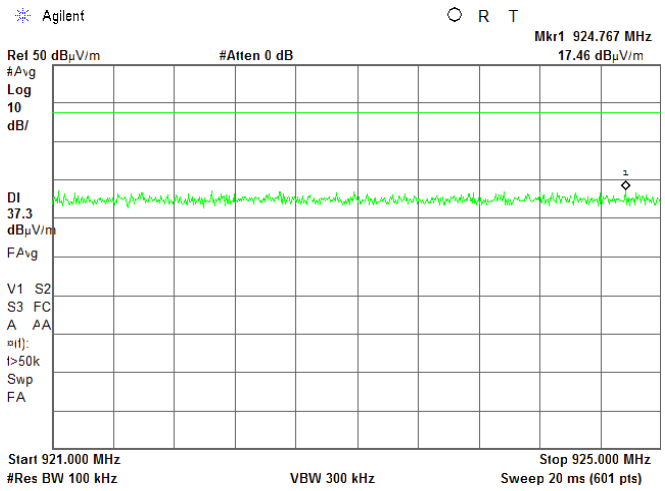
Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

Plot 9.2.9 Radiated emission measurements from 30 to 1000 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



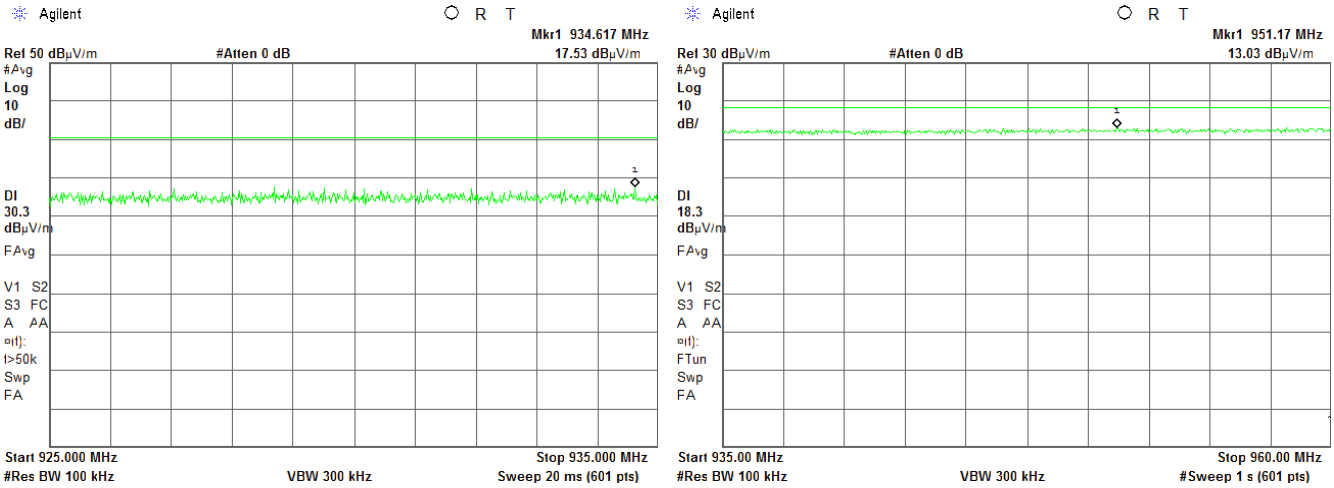




Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

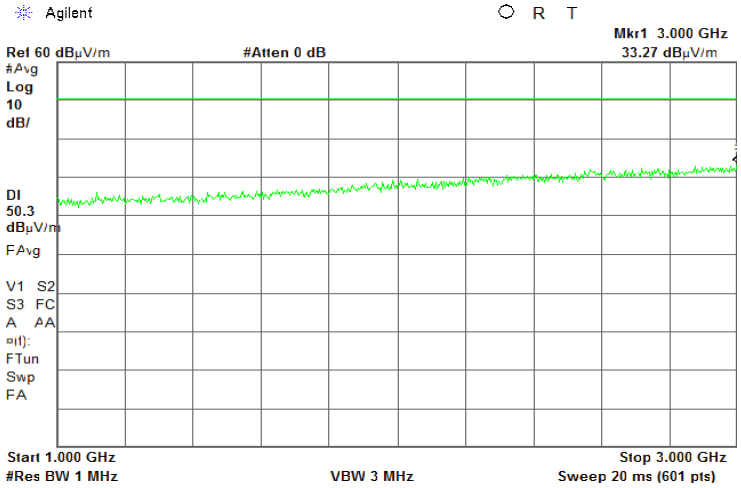
Plot 9.2.10 Radiated emission measurements from 925 to 960 MHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 9.2.11 Radiated emission measurements from 1 to 3 GHz

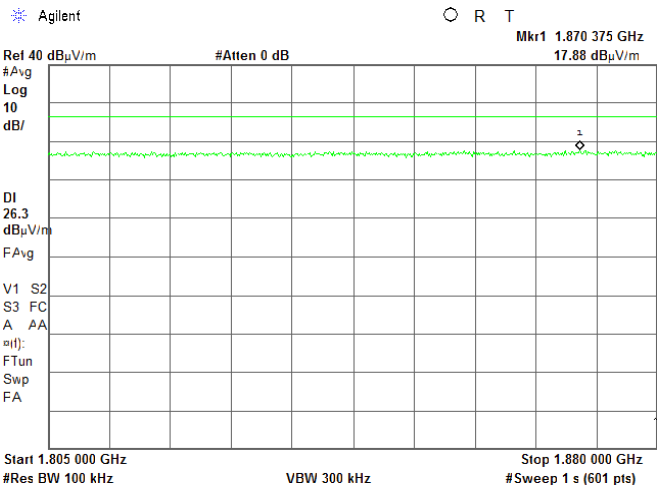
TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal

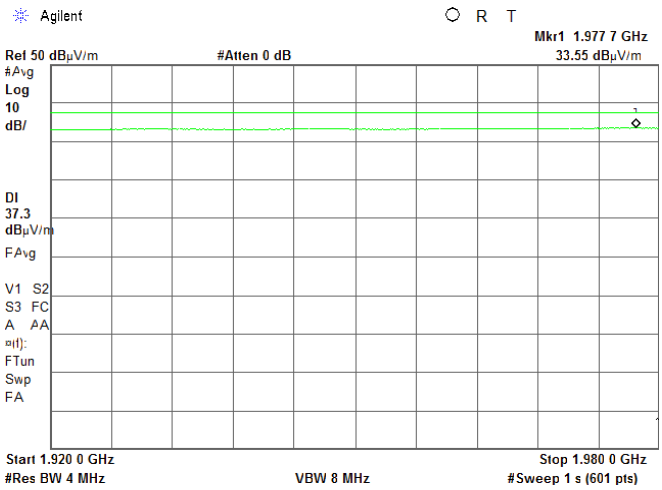


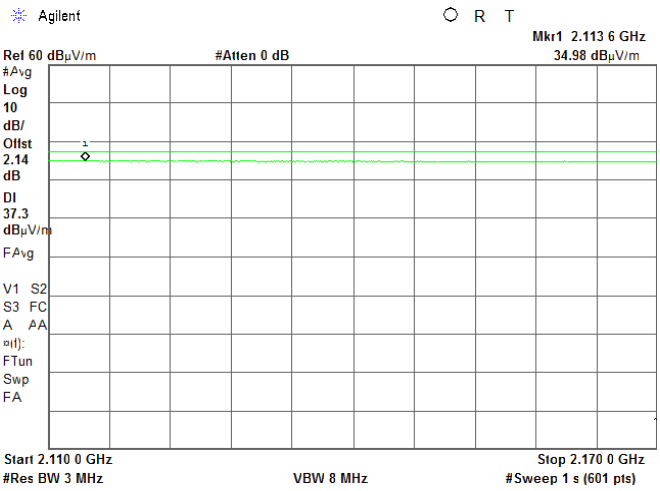
Test specification:	**Transmitter spurious emissions, EN 301 908-2 section 4.2.4**		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	**Verdict:**	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	**Air Pressure:** 1012 hPa	**Relative Humidity:** 48 %	**Power Supply:** 12 VDC
Remarks: 3G module			

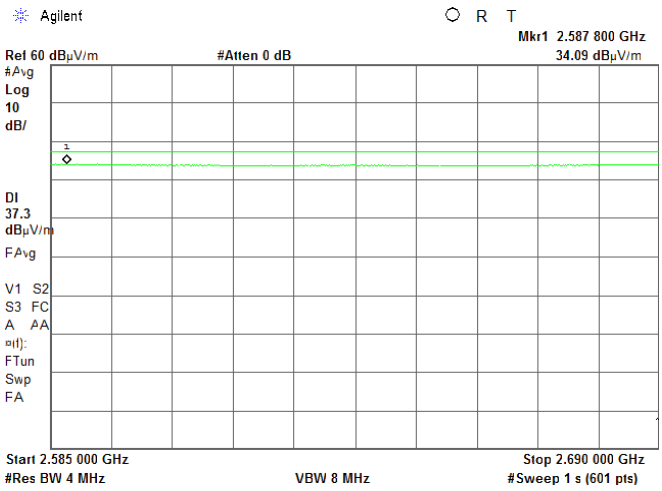
Plot 9.2.12 Radiated emission measurements from 1 to 3 GHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal







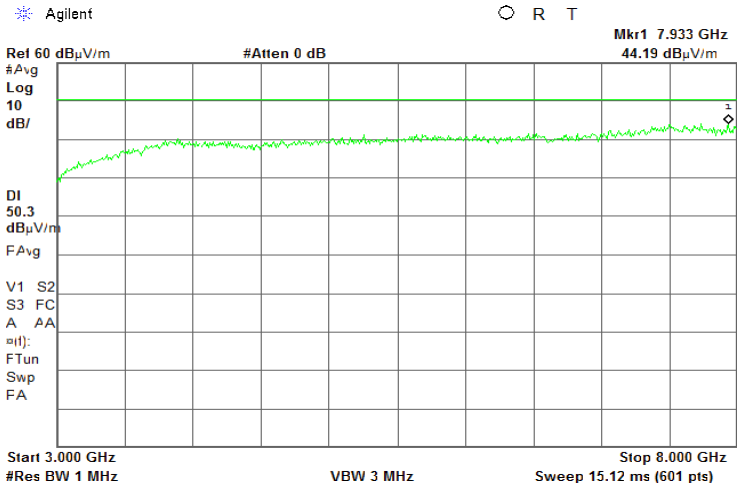


OFF SET=20log(3.84 MHz/RBW)= 20log(3.84 MHz/3 MHz) =2.14 dB

Test specification:	Transmitter spurious emissions, EN 301 908-2 section 4.2.4		
Test procedure:	EN 301 908-2 Section 5.3.3		
Test mode:	Compliance	Verdict:	PASS
Date(s):	30-Sep-15 - 22-Oct-15		
Temperature: 23 ºC	Air Pressure: 1012 hPa	Relative Humidity: 48 %	Power Supply: 12 VDC
Remarks: 3G module			

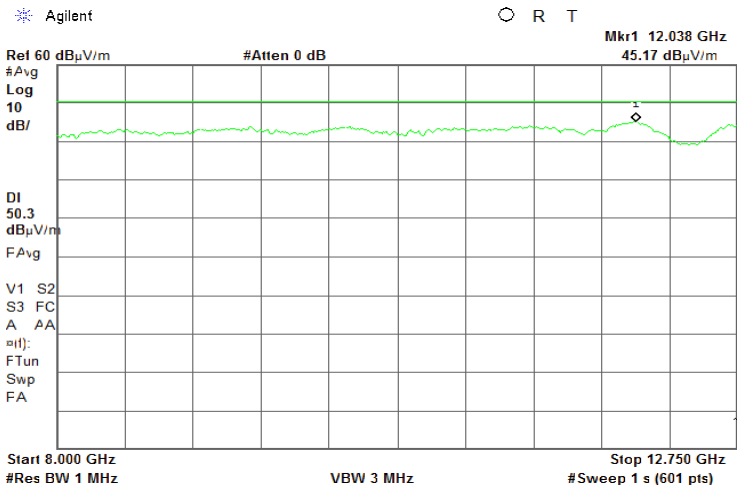
Plot 9.2.13 Radiated emission measurements from3 to 8 GHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



Plot 9.2.14 Radiated emission measurements from8 to 12.75 GHz

TEST SITE: Anechoic chamber
TEST DISTANCE: 3 m
ANTENNA POLARIZATION: Vertical and Horizontal



10 EMF Assessment according to EN 62311 standard

10.1 Limits

The below limits are derived from 1999/519/EC Council Recommendation which is based on ICNIRP Guidelines – 1998.

10.2 Basic restrictions for electric, magnetic and electromagnetic fields (0 Hz to 300 GHz)

Restrictions on exposure to time-varying electric, magnetic, and electromagnetic fields which are based directly on established health effects and biological considerations are termed 'basic restrictions'.

Frequency range	Magnetic flux density, mT	Current density, mA_{rms}/m^2	Whole body average SAR, W/kg	Localised SAR (head and trunk), W/kg	Localised SAR (limbs), W/kg	Power density S, W/m^2
0 Hz	40	-	-	-	-	-
>0-1 Hz	-	8	-	-	-	-
1-4 Hz	-	8/f	-	-	-	-
4-1 000 Hz	-	2	-	-	-	-
1 000 Hz-100 kHz	-	f/500	-	-	-	-
100 kHz-10 MHz	-	f/500	0.08	2	4	-
10 MHz-10 GHz	-	-	0.08	2	4	-
10-300 GHz	-	-	-	-	-	10

10.3 Reference level

Reference levels are provided for practical exposure-assessment purposes to determine whether the basic restrictions are likely to be exceeded.

Frequency range	E-field strength, V/m	H-field strength, A/m	B-field, μT	Equivalent plane wave power density Seq, W/m^2
0-1 Hz	-	32000	40000	-
1-8 Hz	10000	32000	$40000/f^2$	-
8-25 Hz	10000	4000/f	5000/f	-
0.025-0.8 kHz	250/f	4/f	5/f	-
0.8-3 kHz	250/f	5	6.25	-
3-150 kHz	87	5	6.25	-
0.15-1 MHz	87	0.73/f	0.92/f	-
1-10 MHz	$87/\sqrt{f}$ -	0.73/f	0.92/f	-
10-400 MHz	28	0.073	0.092	2
400-2000 MHz	$1.375\sqrt{f}$	$0.0037\sqrt{f}$	$0.0046\sqrt{f}$	f/200
2-300 GHz	61	0.16	0.20	10

10.4 Low power exclusion level

Low-power electronic and electrical equipment is deemed to comply with the provisions of this standard if it can be demonstrated using routes B, C or D that the available antenna power and/or the average total radiated power is less than or equal to the applicable low-power exclusion level Pmax.

Guideline / Standard	SAR limit (SARmax), W/kg	Averaging mass (m), g	Pmax, mW	Exposure tier	Region of body
ICNIRP	2	10	20	General public	Head and trunk
	4	10	40	General public	Limbs
	10	10	100	Occupational	Head and trunk
	20	10	200	Occupational	Limbs
IEEE Std C95.1-1999	1.6	1	1.6	Uncontrolled environment	Head, trunk, arms, legs
	4	10	40	Uncontrolled environment	Hands, wrists, feet and ankles
	8	1	8	Controlled environment	Head, trunk, arms, legs
	20	10	200	Controlled environment	Hands, wrists, feet and ankles
IEEE Std C95.1-2005	2	10	20	Action level	Body except extremities and pinnae
	4	10	40	Action level	Extremities and pinnae
	10	10	100	Controlled environment	Body except extremities and pinnae
	20	10	200	Controlled environment	Extremities and pinnae

10.5 RF exposure assessment

10.5.1 Transmitter output power derrivation

The present EMF assessment report represents an RF exposure evaluation for tracking vehicle product, models: CR300B 3G EU and CR300B 2G based on the test results and technical information provided in sections 8.1 and 9.1 of this test report.

The worst case combinations of output power with the antenna (the highest EIRP) are copied in Table 10.5.1 for the frequency bands under investigation.

Table 10.5.1 Transmitter carrier EIRP

EUT	Frequency, MHz	EIRP		Uncertainty		EIRP expired by uncertainty
		dBm	mW	dB	%	W
CR300B 3G EU	1950	26.51*	447.7	±1.7	+48/-32	0.528
CR300B 2G	1747.5	29.46**	883.1			1.041

* - Table 9.1.3 of POIRAD_EN.27317 test report

** - Table 8.1.3 of POIRAD_EN.27317 test report

10.5.2 Uncertainty of measurement

The measurement uncertainties are ±1.7 dB as reported in the above mentioned test reports or + 48 / -32% if expressed in linear terms. The refrence levels for RF exposure evaluation are derrivated based on uncertainty values within ±30%. If the actual measurement uncertainty is larger than 30 %, then the actual uncertainty shall be included in the evaluation of compliance with the limit as follows:

$$L_m \leq \left(\frac{1}{0.7 + \frac{U(L_m)}{L_m}} \right) L_{lim}$$

where

Lm is the measured value;
Llim is the exposure limit;
U(Lm) is the absolute expanded uncertainty of the measured value.

In this case the limit to demonstrate compliance with RF exposure will be:

$$L_m \leq \left(\frac{1}{0.7 + 0.48} \right) L_{lim} = 0.85\, L_{lim}$$

The limits are based on uncertainty values within ±30% according to section 6 of EN 62311 standard. In this case the measured power levels shall be expanded by the uncertainty value:

EIRP = 447.7 mW +(47.9% - 30.0%) x 447.7 mW = 528 mW

EIRP = 883.1 mW +(47.9% - 30.0%) x 883.1 mW = 1041 mW

10.6 Evaluation of RF exposure

10.6.1 Applicability of limits

The applicable limit was identified based on the target compliance standard/recommendation and typical application of the product. The compliance requirements are according to 1999/519/EC Council Recommendation which is based on ICNIRP Guidelines – 1998.

Frequency range	E-field strength, V/m	H-field strength, A/m	B-field, μT	Equivalent plane wave power density Seq, W/m^2
400-2000 MHz	$1.375\sqrt{f}$	$0.0037\sqrt{f}$	$0.0046\sqrt{f}$	f/200
1747.5 MHz	57.48	0.155	0.19	8.74
1950 MHz	60.72	0.163	0.20	9.75

10.6.2 Minimum separation distance calculation

The minimum separation distance was calculated as a a minimum separation between the radiating structure (antenna) and the victim (humans) that allows compliance with the reference levels. The calculation is based on the far field model as described in the Annex A of EN 62311:2008:

$$PSD = \frac{EIRP}{4\pi r^2}$$

Converting the above equation the minimum separation distance for CR300B 2G device is:

$$r \geq \sqrt{\frac{EIRP\ [W]}{4\pi \times PSD_{lim}\left[\frac{W}{m^2}\right]}} = \sqrt{\frac{1.041}{4\pi \times 8.7}} = 0.097\ m = 0.10\ m$$

The minimum separation distance for CR300B 3G EU device is:

$$r \geq \sqrt{\frac{EIRP\ [W]}{4\pi \times PSD_{lim}\left[\frac{W}{m^2}\right]}} = \sqrt{\frac{0.528}{4\pi \times 9.8}} = 0.07\ m$$

10.6.3 Compliance assessment

Based on the above calculations it has been demonstrated that the PSD radiated by the product, expanded by the uncertainty value is less than the refrence level at the the minimum safety distance and considered complying with the basic restrictions without further measurements:

Total EIRP, W	Safety distance, m	PSD at safety distance, W/m^2	Limit, W/m^2	Margin, W/m^2	Verdict
1.041	0.10	8.28	8.74	-0.46	Pass
0.528	0.07	8.58	9.75	-1.17	Pass

*- Calculated as follows:

$$PSD = \frac{1.041}{4\pi(0.10)^2} = 8.28\ \frac{W}{m^2} \leq 8.74\ \frac{W}{m^2}$$

$$PSD = \frac{0.528}{4\pi(0.07)^2} = 8.58\ \frac{W}{m^2} \leq 9.75\ \frac{W}{m^2}$$

11 Transmitter photographs

11.1 External photos of 2G module

Photograph 11.1.1 Front view

Photograph 11.1.2 Rear view

11.2 Internal photos of 2G module

Photograph 11.2.1 Internal view

Photograph 11.2.2 Component side of the main PCB

Photograph 11.2.3 Print side of the main PCB

Photograph 11.2.4 Component side of the RF PCB

11.3 External photos of 3G module

Photograph 11.3.1 Front view

Photograph 11.3.2 Rear view

11.4 Internal photos of 3G module

Photograph 11.4.1 Internal view

Photograph 11.4.2 Component side of the main PCB

Photograph 11.4.3 Print side of the main PCB

Photograph 11.4.4 Component side of the RF PCB

12 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Oct-15	27-Oct-16
0567	Antenna, Dipole, Tunable, 500 - 1000 MHz	Electro-Metrics	TDS-25/30-2	298	05-Feb-15	05-Feb-16
0661	Generator Swept Signal, 10 MHz to 40 GHz, + 10 dBm	Hewlett Packard	83640B	3614A002 66	07-Apr-15	07-Apr-16
1500	Cable RF, 15 m, N/N-type	Suhner Switzerland	RG 214/U	1500	20-Nov-14	20-Nov-15
1984	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz, 300 W	EMC Test Systems	3115	9911-5964	17-Apr-15	17-Apr-16
2432	Antenna, Double-Ridged Waveguide Horn 1 to 18 GHz	EMC Test Systems	3115	00027177	17-Apr-15	17-Apr-16
2697	Antenna, 30 MHz - 3.0 GHz	Sunol Sciences. Corp. Pleasanton, California USA	JB3	A022805	15-May-15	15-May-16
2780	EMC analyzer, 100 Hz to 26.5 GHz	Agilent Technologies	E7405A	MY451024 62	08-Sep-15	08-Sep-16
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	22-Feb-15	22-Feb-16
3389	Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3389	04-Feb-15	04-Feb-16
3615	Cable RF, 6.5 m, N type-N type, DC-6 GHz	Suhner Switzerland	RG 214/U	NA	16-Sep-15	16-Sep-16
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY482502 88	29-Apr-15	29-Apr-16
4114	Antenna, Double-Ridged Waveguide Horn, 1 to 18 GHz	ETS Lindgren	3117	00123515	19-Dec-14	19-Dec-15
4224	Precision Fixed Attenuator, 50 Ohm, 5W, 10dB, DC to 18000 MHz	Mini-Circuits	BW-N10W5+	NA	09-Mar-15	09-Mar-16
4276	Test Cable , DC-18 GHz, 3.05 m, N/M - N/M	Mini-Circuits	APC-10FT-NMNM+	0747A	20-Nov-14	20-Nov-15
4278	Test Cable , DC-18 GHz, 4.6 m, N/M - N/M	Mini-Circuits	APC-15FT-NMNM+	0755A	20-Nov-14	20-Nov-15
4347	Low Loss Armored Test Cable, DC - 18 GHz, 2.0 m, N type-M/N type-M	MegaPhase	NC29-N1N1-79	12025103 001	08-Jan-15	08-Jan-16
4353	Low Loss Armored Test Cable, DC - 18 GHz, 6.2 m, N type-M/N type-M	MegaPhase	NC29-N1N1-244	12025101 003	15-Mar-15	15-Mar-16
4721	Low Loss Armored Test Cable, DC - 18 GHz, 4.5 m, N type-M/N type-M	MegaPhase	NC29-N1N1-177	51300101 001	12-Jul-15	12-Jul-16
4932	Microwave preamplifier, 500 MHz to 18 GHz, 40 dB Gain	Com-Power Corporation	PAM-118A	551029	18-Nov-14	18-Nov-15

13 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Frequency error 5 – 30 MHz 30 – 300 MHz 300 – 1000 MHz	 ±6.1 Hz (1.22 ppm) ±50.5 Hz (1.68 ppm) ±168 Hz (0.56 ppm)
Carrier power conducted at antenna connector	±1.7 dB
Carrier power radiated (ERP), substitution method	±4.5 dB
Frequency deviation	±7.0%
Range of modulation bandwidth	±8.0%
Spurious emissions conducted at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated, 30 MHz – 40 GHz, substitution method	±4.5 dB

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.
Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.
In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

14 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

Address: P.O. Box 23, Binyamina 30500, Israel.
Telephone: +972 4628 8001
Fax: +972 4628 8277
e-mail: mail@hermonlabs.com
website: www.hermonlabs.com

Person for contact: Mr. Alex Usoskin, CEO.

15 APPENDIX D Specification references

EN 300 440-1 V1.6.1: 2010	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods
EN 300 440-2 V1.4.1: 2010	Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1000 MHz frequency range with power levels ranging up to 500 mW; Part 3: Harmonized EN covering essential requirements under article 3.2 of the R&TTE Directive
EN 301 511 V12.1.1:2015	Global System for Mobile communications (GSM); Harmonized EN for mobile stations in the GSM 900 and GSM 1800 bands covering essential requirements under article 3.2 of the R&TTE directive (1999/5/EC)
TS 151 010-1 V9.3.0:2010	Digital cellular telecommunications system (Phase 2+); Mobile Station (MS) conformance specification; Part 1: Conformance specification (3GPP TS 51.010-1 version 5.7.0 Release 5)
EN 301 908-2 V6.2.1:2013	IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 2: CDMA Direct Spread (UTRA FDD) User Equipment (UE)
ERC REC 70-03	ERC Recommendation 70-03: 2015
EN 62311:2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)
1999/519/EC	COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)
ICNIRP:1998	International Commission on Non-Ionizing Radiation Protection. Guidelines for limiting exposure in time-varying electric, magnetic, and electromagnetic fields (up to 300 GHz)
IEEE Std C95.1-2005	IEEE standard for safety levels with respect to human exposure to radio frequency electromagnetic fields, 3 kHz to 300 GHz
ISO/IEC 17025:2005	General requirements for the competence of testing and calibration laboratories
IEC/TR 62630:2010	Guidance for evaluating exposure from multiple electromagnetic sources

16 APPENDIX E Test equipment correction factors

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field strength in dB(μV/m).

Antenna factor
Double-ridged guide horn antenna
Model 3115, serial number: 00027177, HL 2432

Frequency, MHz	Antenna factor. dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.8
2500.0	28.9
3000.0	30.7
3500.0	31.8
4000.0	33.0
4500.0	32.8
5000.0	34.2
5500.0	34.9
6000.0	35.2
6500.0	35.4
7000.0	36.3
7500.0	37.3
8000.0	37.5
8500.0	38.0
9000.0	38.3
9500.0	38.3
10000.0	38.7
10500.0	38.7
11000.0	38.9
11500.0	39.5
12000.0	39.5
12500.0	39.4
13000.0	40.5
13500.0	40.8
14000.0	41.5
14500.0	41.3
15000.0	40.2
15500.0	38.7
16000.0	38.5
16500.0	39.8
17000.0	41.9
17500.0	45.8
18000.0	49.1

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field strength in dB(μV/m).

Antenna calibration
Sunol Sciences Inc., model JB3, serial number A022805, HL 2697

Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain	Frequency, MHz	ACF, dB	Gain, dBi	Num gain
30	22.2	-22.5	0.01	620	19.7	6.3	4.27	1215	24.9	7.0	5.05	1810	28.3	7.1	5.08	2405	30.9	6.9	4.93
35	18.5	-17.4	0.02	625	19.7	6.5	4.42	1220	24.9	7.0	4.99	1815	28.5	6.9	4.91	2410	30.9	6.9	4.89
40	14.7	-12.5	0.06	630	19.6	6.6	4.57	1225	25.1	6.9	4.91	1820	28.6	6.8	4.74	2415	31.0	6.9	4.85
45	11.3	-8.1	0.16	635	19.7	6.5	4.48	1230	25.2	6.8	4.82	1825	28.7	6.8	4.75	2420	31.0	6.8	4.82
45	11.3	-8.1	0.16	640	19.9	6.4	4.40	1235	25.1	7.0	4.96	1830	28.7	6.8	4.76	2425	31.1	6.8	4.81
50	8.9	-4.7	0.34	645	19.9	6.5	4.45	1240	25.0	7.1	5.09	1835	28.7	6.7	4.72	2430	31.0	6.9	4.87
55	7.9	-2.8	0.52	650	19.9	6.5	4.51	1245	25.0	7.1	5.12	1840	28.8	6.7	4.69	2435	31.0	6.9	4.88
60	7.8	-2.1	0.62	655	19.9	6.6	4.60	1250	25.0	7.1	5.15	1845	28.6	6.9	4.90	2440	31.2	6.8	4.74
65	8.5	-2.0	0.63	660	19.9	6.7	4.69	1255	25.0	7.2	5.25	1850	28.4	7.1	5.12	2445	31.1	6.9	4.91
70	9.0	-1.9	0.64	665	19.9	6.7	4.70	1260	24.9	7.3	5.36	1855	28.5	7.0	5.07	2450	31.0	7.0	4.96
75	8.8	-1.1	0.78	670	20.0	6.7	4.71	1265	25.0	7.3	5.31	1860	28.6	7.0	5.01	2455	31.0	7.0	5.01
80	8.4	-0.2	0.97	675	20.1	6.7	4.71	1270	25.1	7.2	5.26	1865	28.5	7.1	5.17	2460	30.9	7.2	5.19
85	8.0	0.8	1.20	680	20.1	6.7	4.71	1275	25.3	7.0	5.05	1870	28.4	7.3	5.33	2465	31.1	6.9	4.95
90	8.2	1.1	1.29	685	20.1	6.8	4.79	1280	25.5	6.8	4.84	1875	28.4	7.2	5.28	2470	31.3	6.8	4.76
95	9.2	0.5	1.13	690	20.1	6.9	4.88	1285	25.4	7.0	4.97	1880	28.5	7.2	5.22	2475	31.4	6.7	4.69
100	10.6	-0.4	0.92	695	20.2	6.8	4.82	1290	25.3	7.1	5.10	1885	28.5	7.2	5.22	2480	31.3	6.8	4.79
110	12.6	-1.6	0.70	705	20.4	6.8	4.75	1300	25.2	7.3	5.33	1895	28.6	7.2	5.24	2490	31.1	7.0	4.99
120	13.9	-2.1	0.62	715	20.5	6.8	4.80	1310	25.5	7.1	5.09	1905	28.5	7.3	5.36	2500	30.9	7.2	5.27
125	14.2	-2.0	0.63	720	20.5	6.9	4.85	1315	25.4	7.2	5.23	1910	28.5	7.4	5.45	2505	31.1	7.1	5.15
130	14.2	-1.7	0.68	725	20.6	6.8	4.81	1320	25.3	7.3	5.36	1915	28.5	7.3	5.38	2510	31.0	7.2	5.22
140	13.4	-0.3	0.94	735	20.9	6.7	4.65	1330	25.6	7.0	5.06	1925	28.6	7.3	5.35	2520	31.2	7.0	5.05
150	12.9	0.8	1.21	745	21.0	6.6	4.59	1340	25.7	7.1	5.09	1935	28.5	7.4	5.54	2530	31.0	7.3	5.37
160	12.7	1.6	1.44	755	21.0	6.8	4.74	1350	25.7	7.1	5.17	1945	28.5	7.5	5.59	2540	31.2	7.1	5.09
165	12.5	2.0	1.59	760	21.0	6.8	4.83	1355	25.8	7.0	5.06	1950	28.6	7.4	5.48	2545	31.0	7.3	5.43
170	12.2	2.6	1.83	765	21.1	6.8	4.73	1360	25.9	6.9	4.95	1955	28.6	7.5	5.57	2550	31.0	7.3	5.39
175	11.8	3.3	2.13	770	21.3	6.7	4.64	1365	26.0	6.9	4.95	1960	28.6	7.5	5.65	2555	31.1	7.2	5.30
180	11.6	3.7	2.36	775	21.3	6.7	4.68	1370	26.0	7.0	4.96	1965	28.7	7.4	5.47	2560	31.0	7.4	5.47
185	11.5	4.0	2.54	780	21.3	6.7	4.72	1375	26.0	7.0	5.01	1970	28.9	7.2	5.29	2565	30.8	7.6	5.70
190	11.6	4.2	2.61	785	21.3	6.8	4.77	1380	26.0	7.0	5.06	1975	28.9	7.2	5.22	2570	31.1	7.3	5.37
200	13.1	3.2	2.07	795	21.4	6.8	4.79	1390	26.1	6.9	4.92	1985	29.1	7.1	5.11	2580	31.6	6.9	4.87
205	12.0	4.4	2.76	800	21.5	6.8	4.77	1395	26.2	6.9	4.94	1990	29.1	7.0	5.06	2585	31.6	6.8	4.79
210	11.0	5.6	3.66	805	21.6	6.7	4.71	1400	26.2	7.0	4.96	1995	29.1	7.1	5.09	2590	31.6	6.9	4.88
215	11.3	5.6	3.59	810	21.7	6.7	4.65	1405	26.1	7.0	5.02	2000	29.1	7.1	5.11	2595	31.5	7.0	4.97
220	11.6	5.5	3.52	815	21.7	6.7	4.72	1410	26.1	7.1	5.09	2005	29.1	7.1	5.16	2600	31.6	6.9	4.86
225	11.7	5.5	3.55	820	21.7	6.8	4.80	1415	26.2	7.0	5.02	2010	29.1	7.1	5.15	2605	31.3	7.2	5.30
230	11.9	5.5	3.57	825	21.7	6.8	4.82	1420	26.3	7.0	4.96	2015	29.2	7.1	5.13	2610	31.4	7.1	5.15
235	12.1	5.5	3.56	830	21.7	6.9	4.85	1425	26.2	7.1	5.10	2020	29.2	7.1	5.18	2615	31.7	6.9	4.88
240	12.3	5.5	3.54	835	21.8	6.8	4.82	1430	26.1	7.2	5.25	2025	29.3	7.1	5.08	2620	31.6	7.0	4.97
245	12.3	5.7	3.71	840	21.9	6.8	4.80	1435	26.1	7.2	5.24	2030	29.3	7.0	5.05	2625	31.4	7.1	5.17
250	12.3	5.9	3.88	845	21.9	6.8	4.83	1440	26.2	7.2	5.24	2035	29.3	7.1	5.07	2630	31.6	7.0	5.00
255	12.5	5.9	3.85	850	21.9	6.9	4.86	1445	26.3	1	5.11	2040	29.3	7.1	5.13	2635	31.8	6.8	4.82
260	12.7	5.8	3.83	855	22.0	6.8	4.80	1450	26.5	7.0	4.98	2045	29.2	7.2	5.23	2640	31.7	7.0	4.98
265	13.2	5.5	3.54	860	22.1	6.8	4.74	1455	26.4	7.1	5.07	2050	29.2	7.2	5.27	2645	31.7	6.9	4.93
270	13.7	5.2	3.27	865	22.0	6.9	4.92	1460	26.4	7.1	5.17	2055	29.3	7.2	5.21	2650	31.8	6.9	4.85
275	13.7	5.3	3.39	870	21.9	7.1	5.11	1465	26.4	7.2	5.19	2060	29.5	7.0	5.02	2655	31.8	6.9	4.85
280	13.7	5.4	3.50	875	22.0	7.1	5.08	1470	26.4	7.2	5.22	2065	29.4	7.1	5.08	2660	31.7	7.0	5.02
285	13.7	5.6	3.61	880	22.1	7.0	5.05	1475	26.4	7.1	5.17	2070	29.4	7.1	5.10	2665	32.0	6.7	4.71
290	13.7	5.7	3.72	885	22.1	7.0	5.06	1480	26.5	7.1	5.12	2075	29.5	7.0	5.01	2670	32.0	6.7	4.67
295	13.8	5.8	3.77	890	22.1	7.0	5.06	1485	26.5	7.1	5.14	2080	29.8	6.8	4.76	2675	31.9	6.8	4.81
300	13.9	5.8	3.81	895	22.2	7.1	5.09	1490	26.5	7.1	5.17	2085	29.7	6.9	4.89	2680	31.7	7.0	5.04
305	14.0	5.9	3.85	900	22.2	7.1	5.12	1495	26.5	7.2	5.24	2090	29.7	6.9	4.86	2685	31.9	6.8	4.83
310	14.1	5.9	3.88	905	22.3	7.1	5.09	1500	26.5	7.2	5.31	2095	29.8	6.8	4.78	2690	32.1	6.7	4.72
315	14.3	5.9	3.89	910	22.3	7.0	5.05	1505	26.5	7.2	5.27	2100	29.9	6.8	4.75	2695	32.1	6.7	4.71
320	14.4	5.9	3.90	915	22.4	7.0	4.99	1510	26.6	7.2	5.23	2105	29.8	6.8	4.81	2700	32.0	6.8	4.81
325	14.5	5.9	3.92	920	22.6	6.9	4.92	1515	26.6	7.2	5.30	2110	29.9	6.8	4.78	2705	32.0	6.8	4.80
330	14.6	5.9	3.93	925	22.7	6.9	4.85	1520	26.5	7.3	5.38	2115	29.9	6.8	4.76	2710	32.1	6.8	4.79
335	14.7	6.0	4.02	930	22.8	6.8	4.77	1525	26.6	7.3	5.37	2120	29.9	6.8	4.84	2715	32.1	6.7	4.71
340	14.7	6.2	4.12	935	22.8	6.8	4.83	1530	26.6	7.3	5.36	2125	29.9	6.9	4.89	2720	32.4	6.5	4.47
345	14.9	6.1	4.06	940	22.8	6.9	4.89	1535	26.6	7.4	5.44	2130	29.9	6.9	4.90	2725	32.2	6.7	4.63
350	15.1	6.0	3.99	945	22.8	6.9	4.87	1540	26.5	7.4	5.53	2135	29.8	6.9	4.94	2730	31.9	7.0	5.05
355	15.3	5.9	3.88	950	22.9	6.9	4.85	1545	26.5	7.5	5.58	2140	29.8	7.1	5.08	2735	31.6	7.4	5.44
360	15.6	5.8	3.78	955	23.0	6.8	4.81	1550	26.5	7.5	5.63	2145	29.9	6.9	4.92	2740	31.6	7.1	5.46
365	15.5	5.9	3.89	960	23.1	6.8	4.77	1555	26.7	7.3	5.39	2150	29.9	7.0	4.98	2745	31.9	7.0	5.06
370	15.5	6.0	4.01	965	23.1	6.7	4.73	1560	26.9	7.1	5.16	2155	29.8	7.1	5.10	2750	32.0	6.9	4.94
375	15.6	6.1	4.03	970	23.2	6.7	4.69	1565	26.9	7.2	5.23	2160	29.8	7.1	5.09	2755	32.0	7.0	4.98
380	15.7	6.1	4.05	975	23.3	6.6	4.62	1570	26.9	7.2	5.30	2165	29.9	7.0	5.00	2760	32.0	7.0	5.06
385	15.7	6.2	4.15	980	23.5	6.6	4.54	1575	27.0	7.2	5.23	2170	29.9	7.1	5.07	2765	32.2	6.8	4.80
390	15.7	6.3	4.25	985	23.5	6.6	4.52	1580	27.0	7.1	5.17	2175	29.8	7.2	5.20	2770	32.3	6.8	4.73
395	15.9	6.3	4.22	990	23.6	6.5	4.50	1585	27.0	7.2	5.20	2180	29.8	7.2	5.27	2775	32.3	6.8	4.77
400	16.0	6.2	4.18	995	23.6	6.5	4.48	1590	27.0	7.2	5.22	2185	29.8	7.2	5.27	2780	32.3	6.8	4.82
405	16.3	6.1	4.07	1000	23.7	6.5	4.46	1595	27.0	7.2	5.29	2190	29.8	7.2	5.28	2785	32.7	6.4	4.41
410	16.5	6.0	3.96	1005	23.7	6.5	4.51	1600	27.0	7.3	5.36	2195	29.8	7.2	5.30	2790	32.8	6.3	4.25
415	16.5	6.0	4.00	1010	23.7	6.6	4.57	1605	27.0	7.3	5.38	2200	29.7	7.3	5.38	2795	32.8	6.4	4.33
420	16.6	6.1	4.03	1015	23.7	6.6	4.55	1610	27.0	7.3	5.41	2205	29.7	7.3	5.41	2800	32.5	6.7	4.66
425	16.6	6.1	4.10	1020	23.8	6.6	4.54	1615	27.1	7.3	5.33	2210	29.7	7.4	5.47	2805	32.5	6.6	4.62
430	16.7	6.2	4.16	1025	23.8	6.6	4.62	1620	27.2	7.2	5.27	2215	29.7	7.4	5.54	2810	32.5	6.7	4.70
435	16.9	6.1	4.05	1030	23.7	6.7	4.70	1625	27.2	7.2	5.30	2220	29.7	7.5	5.57	2815	32.3	6.9	4.85
440	17.1	5.9	3.93	1035	23.7	6.8	4.81	1630	27.2	7.3	5.33	2225	29.8	7.3	5.43	2820	32.2	7.0	5.01
445	17.2	6.0	3.97	1040	23.6	6.9	4.92	1635	27.2	7.3	5.35	2230	29.8	7.4	5.45	2825	32.3	7.0	4.96
450	17.2	6.0	4.00	1045	23.7	6.9	4.91	1640	27.2	7.3	5.36	2235	29.7	7.5	5.61	2830	32.4	6.8	4.80
455	17.3	6.1	4.04	1050	23.7	6.9	4.91	1645	27.3	7.2	5.22	2240	29.5	7.7	5.86	2835	32.5	6.7	4.68
460	17.4	6.1	4.07	1055	23.7	7.0	5.01	1650	27.5	7.1	5.09	2245	29.8	7.4	5.53	2840	32.5	6.8	4.78
465	17.5	6.1	4.05	1060	23.6	7.1	5.11	1655	27.5	7.1	5.11	2250	30.0	7.3	5.35	2845	32.6	6.6	4.62
470	17.6	6.1	4.04	1065	23.7	7.0	5.06	1660	27.5	7.1	5.13	2255	30.0	7.2	5.28	2850	32.6	6.7	4.70
475	17.7	6.0	3.99	1070	23.8	7.0	5.01	1665	27.6	7.0	5.06	2260	30.1	7.2	5.24	2855	32.4	6.9	4.88
480	17.9	5.9	3.93	1075	23.8	7.0	5.01	1670	27.7	7.0	4.99	2265	30.1	7.2	5.20	2860	32.4	7.0	4.98
485	18.0	5.9	3.88	1080	23.9	7.0	5.01	1675	27.7	7.0	5.02	2270	30.2	7.1	5.12	2865	32.8	6.5	4.52
490	18.2	5.8	3.82	1085	24.0	7.0	4.96	1680	27.7	7.0	5.05	2275	30.3	7.0	5.05	2870	33.0	6.3	4.30
495	18.0	6.0	4.02	1090	24.0	6.9	4.91	1685	27.7	7.0	5.01	2280	30.0	7.0	5.06	2875	33.0	6.4	4.38
500	17.9	6.3	4.23	1095	24.1	6.9	4.86	1690	27.8	7.0	4.98	2285	30.3	7.0	5.05	2880	32.5	6.9	4.87
505	17.9	6.3	4.29	1100	24.2	6.8	4.82	1695	27.8	7.0	5.01	2290	30.3	7.1	5.07	2885	33.0	6.4	4.40
510	18.0	6.4	4.36	1105	24.3	6.8	4.80	1700	27.8	7.0	5.03	2295	30.3	7.1	5.13	2890	33.1	6.3	4.28
515	18.1	6.4	4.34	1110	24.3	6.8	4.78	1705	27.8	7.1	5.09	2300	30.2	7.2	5.23	2895	33.1	6.4	4.34
520	18.2	6.4	4.32	1115	24.3	6.8	4.79	1710	27.7	7.1	5.16	2305	30.3	7.2	5.20	2900	33.0	6.4	4.41
525	18.2	6.4	4.36	1120	24.4	6.8	4.80	1715	27.8	7.1	5.08	2310	30.2	7.3	5.35	2905	32.9	6.6	4.58
530	18.3	6.4	4.39	1125	24.3	6.9	4.90	1720	27.9	7.0	5.00	2315	30.1	7.4	5.45	2910	32.9	6.5	4.51
535	18.3	6.4	4.41	1130	24.3	7.0	5.00	1725	28.0	7.0	4.99	2320	30.3	7.2	5.27	2915	33.1	6.4	4.33
540	18.4	6.4	4.41	1135	24.4	6.9	4.90	1730	28.0	7.0	4.98	2325	304	7.2	5.22	2920	33.3	6.2	4.16
545	18.4	6.5	4.47	1140	24.5	6.8	4.81	1735	28.0	7.0	5.02	2330	30.4	7.1	5.13	2925	33.0	6.5	4.45
550	18.4	6.6	4.53	1145	24.6	6.8	4.76	1740	28.0	7.1	5.07	2335	30.5	7.0	5.07	2930	33.0	6.5	4.51
555	18.6	6.5	4.45	1150	24.7	6.7	4.71	1745	28.0	7.0	5.04	2340	30.5	7.1	5.11	2935	33.0	6.5	4.48
560	18.8	6.4	4.37	1155	24.7	6.8	4.76	1750	28.1	7.0	5.01	2345	30.6	7.0	5.07	2940	33.0	6.5	4.52
565	18.9	6.4	4.33	1160	24.7	6.8	4.80	1755	27.9	7.1	5.17	2350	30.5	7.1	5.12	2945	33.1	6.5	4.42
570	19.0	6.3	4.28	1165	24.7	6.8	4.81	1760	27.8	7.3	5.34	2355	30.6	7.1	5.08	2950	33.2	6.4	4.32
575	19.1	6.3	4.31	1170	24.7	6.8	4.81	1765	27.9	7.3	5.31	2360	30.9	6.8	4.79	2955	33.3	6.3	4.27
580	19.1	6.4	4.33	1175	24.8	6.8	4.84	1770	27.9	7.2	5.28	2365	31.0	6.7	4.66	2960	33.3	6.3	4.30
590	19.1	6.6	4.52	1185	24.8	6.9	4.92	1780	27.9	7.3	5.35	2375	31.1	6.6	4.60	2970	33.3	6.4	4.36
595	19.0	6.6	4.62	1190	24.7	7.0	4.99	1785	28.1	7.2	5.21	2380	31.1	6.6	4.61	2975	33.0	6.6	4.60
600	19.0	6.7	4.72	1195	24.7	7.0	5.02	1790	28.2	7.0	5.07	2385	31.1	6.7	4.62	2980	32.9	6.8	4.74
610	19.1	6.8	4.76	1205	24.08	7.1	5.08	1800	28.3	7.0	5.06	2395	31.2	6.6	4.60	2990	32.9	6.8	4.82
615	19.4	6.5	4.51	1210	24.8	7.1	5.11	1805	28.3	7.1	5.07	2400	30.9	6.9	4.93	3000	33.4	6.4	4.33

Antenna factor
Double-ridged waveguide horn antenna
ETS Lindgren, Model 3117, serial number: 00123515, HL 4114

Frequency, MHz	Antenna factor, dB/m		
	Measured	Manufacturer	Deviation
1000	28.0	28.4	-0.4
1500	28.0	27.4	0.6
2000	31.2	30.9	0.3
2500	32.5	33.4	-0.9
3000	32.9	32.6	0.3
3500	32.7	32.8	-0.1
4000	33.1	33.4	-0.3
4500	33.8	33.9	-0.1
5000	33.8	34.1	-0.3
5500	34.4	34.5	-0.1
6000	35.0	35.2	-0.2
6500	35.4	35.5	-0.1
7000	35.7	35.7	0.0
7500	35.9	35.7	0.2
8000	35.8	35.8	0.0
8500	35.9	35.8	0.1
9000	36.3	36.2	0.1
9500	36.6	36.6	0.0
10000	37.1	37.1	0.0
10500	37.6	37.5	0.1
11000	37.9	37.7	0.2
11500	38.5	38.1	0.4
12000	39.2	38.7	0.5
12500	39.0	38.9	0.1
13000	39.1	39.1	0.0
13500	38.9	38.8	0.1
14000	39.0	38.8	0.2
14500	39.6	39.9	-0.3
15000	39.9	39.7	0.2
15500	39.9	40.1	-0.2
16000	40.7	40.8	-0.1
16500	41.3	41.8	-0.5
17000	42.5	42.1	0.4
17500	41.3	41.2	0.1
18000	41.4	40.9	0.5

Antenna factor is to be added to receiver meter reading in dB(μV) to convert to field strength in dB(μV/meter)

17 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
AM	amplitude modulation
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
PM	pulse modulation
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
WB	wideband

END OF TEST REPORT

18 APPENDIX G Manufacturer's declaration of identity

POINTER

Declaration of Identity

We, the undersigned,

Company: Pointer Telocation Inc
Address: 7715 NW 48th Street, Suite 395
Country: Doral, FL 33166
Telephone number: (305) 903-6634

declare under our sole responsibility that the following equipment:

Brand/Item	Type/Model	Short Product description
CR300B 3G EU	CT7801202-000	Vehicle Tracking equipment with 3G modem
CR300B 2G	CT7801201-000	Vehicle Tracking equipment with 2G modem

is electronically/electrically/mechanically identical to the following equipment (including Software/Hardware version(s)):

Brand/Item	Type/Model	Short Product description
CR300B 3G EU	CT7801212-000	Same as above with Different enclosure shape
CR300B 2G	CT7801211-000	Same as above with Different enclosure shape
CR300 3G EU	CT7801206-000	Same as above without internal battery
CR300 2G	CT7801205-000	Same as above without internal battery

The reason for name change is: Marketing purposes

.....
(date)

IGOR ROGOV
09-03-2016
VP R&D

.....
(signature)

.....
(printed name)

.....
(position)

.....
(company stamp)

END OF DOCUMENT